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ELECTROMAGNETIC PROPERTIES OF SOILS AT THREE TEST SITES NEAR FORT MONMOUTH, NEW JERSEY

William H. Hulse, et al

Army Electronics Command
Fort Monmouth, New Jersey

December 1972

AD

Research and Development Technical Report
ECOM-4063

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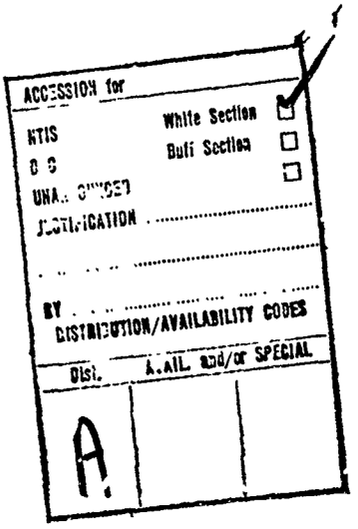
ECOM

UNITED STATES ARMY ELECTRONICS COMMAND · FORT MONMOUTH, N.J.



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1. ORIGINATING ACTIVITY (Corporate author)	2a. REPORT SECURITY CLASSIFICATION
U. S. Army Electronics Command Fort Monmouth, New Jersey 07703	UNCLASSIED 2b. GROUP

3. REPORT TITLE

ELECTROMAGNETIC PROPERTIES OF SOILS AT THREE TEST SITES NEAR FORT MONMOUTH, NEW JERSEY

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Technical Report

5. AUTHOR(S) (First name, middle initial, last name)

William H. Hulse
John W. Walker

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1972	53	5

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1T0 61102 B31A	ECOM-4063
c. Task No. -01	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d. Work Unit No. -364	

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	U. S. Army Electronics Command ATTN: AMSEL-TL-AS Fort Monmouth, New Jersey 07703

13. ABSTRACT

The electromagnetic properties of the surface and subsurface materials of the Evans, Wayside, and Deal Areas of Fort Monmouth, New Jersey, are described. The object of the investigation was to provide engineers and scientists with supplementary data to aid in assaying experimental observations or equipment performance when there is significant interaction between the propagated energy and the near-surface soil material.

The soil of the Evans Area is a thin, poorly developed, but well-drained sand loam, seldom more than one to two feet in thickness, which is underlain by gravel and fine quartz sand. At Wayside, the soil is a predominantly reddish sandy loam that may locally display a distinct greenish color derived from the mineral glauconite, which is disseminated in varying proportions through the sand below. The electrical conductivity of both the Evans and Wayside Areas is very low, generally 1 mmho/m or less. Although glauconite can raise the conductivity of the soil substantially, the concentration present at Wayside is insufficient to cause a noticeable increase.

The southeastern portion of the Deal Test Site which is underlain by quartz sand and gravels and covered by a thinly developed sandy loam, is similar to the Evans Test Site in respect to both physical properties and the attending low electrical conductivity of the near-surface materials. However, the northwestern portion of the Deal Test Site is marshy and underlain by glauconite sand with low quartz content. The highest electrical conductivity, 47 mmho/m, is associated with concentrated deposits of glauconite; the electrical conductivity drops off sharply as the amount of quartz sand increases independent of moisture content. Lenses of limonite, a hydrous ferric

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13. Abstract (Cont)

oxide locally referred to as bog iron, occur within a few inches of the surface at scattered locations; however, this material does not contribute to the increased conductivity of the area. If the bog iron is composed of such minerals as goethite, hematite, a ferric oxide gel or ocher, the electrical conductivity should be consistently low. The high water table of this marsh area combined with the high electrical conductivity of the glauconite sand produces excellent grounding conditions and a natural counterpoise for antennas. The present investigation shows that similar conditions do not exist in either of the other two areas discussed in this report.

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Test Sites						
Conductivity (Electrical)						
Soils						
Coastal Plain						
Geology						
Attenuation						
Dielectric Constant						
Electromagnetic Parameters						

HISA FM 454-73

Security Classification

I 0

Reports Control Symbol OSD-1366

TECHNICAL REPORT ECOM-4063

ELECTROMAGNETIC PROPERTIES OF SOILS AT THREE TEST SITES NEAR FORT MONMOUTH, NEW JERSEY

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December 1972

DA Work Unit No. 1T0 61102 B31A 01 364

U. S. ARMY ELECTRONICS COMMAND
FORT MONMOUTH, NEW JERSEY 07703

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ELECTROMAGNETIC PROPERTIES OF SOILS AT THREE TEST SITES NEAR FORT MONMOUTH, NEW JERSEY

I. INTRODUCTION

The electrical properties of both the surface and subsurface soil influence the propagation of electromagnetic energy over as well as through the earth. Any device which is dependent on an electrical interface with the earth will be affected by perturbations arising from variations in the electrical properties; a knowledge of these variations is essential, particularly when evaluating equipment performance.

The Ground Effects Research Team of the U. S. Army Electronics Technology and Devices Laboratory, Fort Monmouth, N. J., is currently conducting studies to develop a predictive model for estimating EM parameters of soils in militarily inaccessible areas. The chemical and mineralogical soil properties will be correlated with certain environmental factors. It has been established that the mineralogical environment, the weathering end-products (clays), the clastic content, and the moisture regime are the principal elements to be considered.[1]

II. PURPOSE

This survey was made, in part, in response to a request from the Office of the Associate Director for Laboratory Operations, Directorate of Research, Development and Engineering, for analysis of the electrical properties of field test sites located at the Evans, Wayside, and Deal Areas of Fort Monmouth. Since many experiments had been concluded and others were in progress at these sites, an evaluation of the electrical properties of the surface and subsurface soil was needed to provide scientists and engineers with qualitative and quantitative information for use in assaying field observations and equipment performance.

III. SCOPE

The information presented in this report is the result of a reconnaissance investigation in which four equally spaced borings were made at each site to produce a representative profile of the local surface and shallow subsurface conditions. With the exception of the Deal Test Site, the soil properties are fairly homogeneous and the data and interpretation provided can be applied rather broadly within the New Jersey Coastal Plain.

The maximum depth of sampling was 10 feet; however, several borings were terminated at a lesser depth due to hole collapse or shallow water influx.

The low-frequency electrical conductivity, moisture content, dry density and specific gravity of each soil sample were used to estimate the frequency dependent parameters of dielectric constant, effective conductivity, attenuation, and loss tangent in the 50-500 MHz range.

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[1] William H. Hulse, John W. Walker, and Douglas C. Pearce, "Electrical conductivity studies of the soils of the Middle Atlantic Region: Virginia," R&D Technical Report ECOM-3564, April 1972, U. S. Army Electronics Command, Fort Monmouth, N. J.

IV. SAMPLING AND MEASUREMENT TECHNIQUES

The three test areas lie within the physiographic province of the New Jersey Coastal Plain. As a result, the soils are poorly developed; with the exception of a thin surface veneer, the material is more correctly treated as relatively unaltered Tertiary and Cretaceous marine deposits. Since the borings were very shallow with respect to the magnitude of vertical stratification, they were arranged to obtain the most general representation of the lateral variations rather than a classical stratigraphic cross section. The data obtained is broadly representative of the characteristic surface material and safe generalizations can be made with respect to all of the local Coastal Plain except for the sea- and bay-margin areas.

For identification purposes, each boring has been given an alpha-numeric descriptor; Figs. 1-3 show the location of the borings with respect to landmarks and property boundaries. Standard disturbed sampling techniques were employed with sampling of 1-foot intervals to total depth.

The low-frequency conductivity (σ dc) was measured using a technique previously developed by Walker and Pearce.[2] Moisture content, dry density, and specific gravity were measured using standard ASTM procedures.

Data obtained from the above measurements was used to estimate the electrical properties of the soil in the VHF-UHF range by digital computation. The estimates were based on a theory of multicomponent systems which has recently been developed at this Laboratory.[3] Table I gives the electromagnetic parameters for each sample. The boring descriptor, sample interval, moisture content, dry density and specific gravity for each soil sample are given at the top of each column.

V. SITE EVALUATION

A. Evans Area G

This field site is situated in the southernmost portion of the Evans Area which is located in the Township of Wall, Monmouth County, N. J. The general area is dominated by gently rolling hills and terraces; the higher terraces on which the Evans Area is situated are capped by the Pensauken gravels and sand. The test area is an open field with low grass cover; small scrub and patchy wood lots remain in the marginal areas. The uppermost layer is a very thin, poorly developed sandy loam underlain by intercalated layers of gravel and gravelly sand which is in turn underlain by the Tertiary Kirkwood formation, a very fine, slightly micaceous quartz sand. The subsurface conditions are fairly homogeneous and typical of much of the region.

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[2] John W. Walker and Douglas C. Pearce, "Resistivity test set for the reconnaissance of soil electromagnetic parameters," R&D Technical Report ECOM-3240, February 1970, U. S. Army Electronics Command, Fort Monmouth, New Jersey.

[3] D. C. Pearce, W. H. Hulse, and J. W. Walker, "The application of heterogeneous dielectric theory to soil systems," Manuscript submitted to IEEE, September 1972.

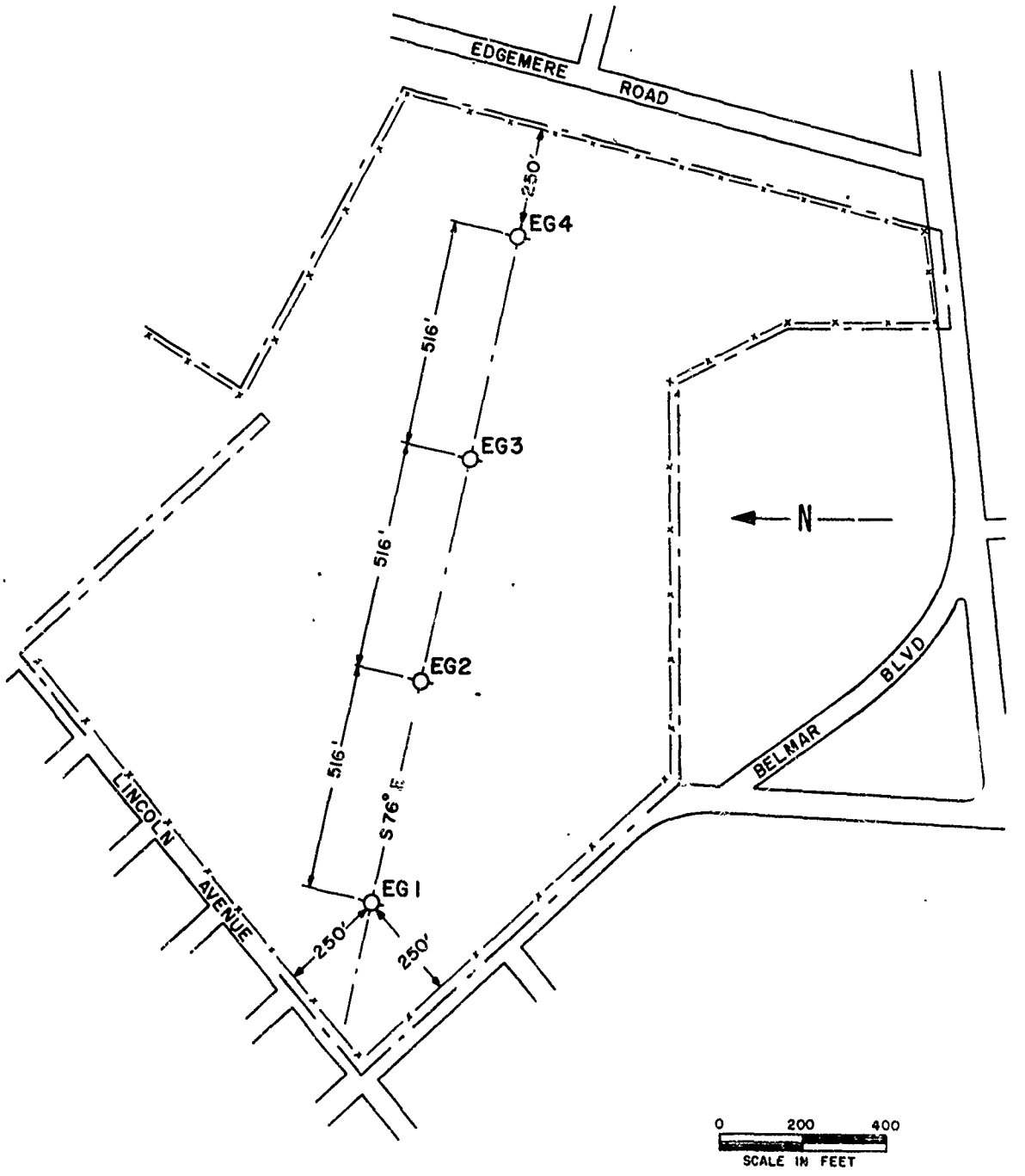

Figure 1. Evans Area Test Site.

Borings EG2 and EG3 were abandoned at -8 feet and -7 feet, respectively, because of continuous sloughing and hole collapse. Boring EG4 was abandoned at -8 feet when shallow water was encountered. This latter boring was located at the lowest elevation of the test area (∿63 ft above sea level). Since the depth of such shallow-water zones commonly varies, no attempt has been made to establish an accurate elevation to this zone.

Figure 1 shows the orientation of the site and location of the borings. Note from Table I that the low frequency conductivity (σ dc) of most of the soil samples is below 1 mmho/m. Some of the near-surface materials are somewhat more conductive due to higher moisture and clay contents. At this site, the soil below -3 feet has the lowest conductivity; the values are typical for a material which is chiefly composed of quartz and kaolin.

The effective conductivity is given in Table I as a function of frequency. It can be observed that the effective conductivity is greater than σ dc as a consequence of the dissipative effects of the dielectric relaxation mechanism of water.[3,4]

B. The Deal Test Site

Figure 2 shows the location of the sample borings and orientation of this test site. Located at Deal, N. J., the site is situated on gently rolling hills and low terraces capped by the sands and gravels of the Cape May formation. The glauconitic Hornerstown and Vincentown formations of the Tertiary are also exposed in this area. Several low areas adjacent to small brooks form bog and marshland. The southernmost portion of the site, which borders Deal Road, is very similar both physically and electrically to Evans Area G.

The soil of the central and northwestern portions of the Deal Test Site is composed of an olive- to dark-green glauconite (a montmorillonite group mineral) marl mixed with varying proportions of fine-to-medium grained quartz sand. A shallow limonite (bog iron) deposit also crops out in this area; however, other than trap surface water in the thin overlying soil, the deposit contributes little to the conductivity. Principally composed of goethite, often with hematite and a ferric oxide gel or red and brown ochre impurities, limonite has been found to respond much the same as kaolin and the hydroxides with respect to electrical conductivity.[4] Cation exchange capacity and, hence conductivity, are low and the observed variations are largely due to changes in moisture content. At Boring D2, the shallow water table was encountered within the first foot from the surface; the associated water source here has not been known to show appreciable seasonal declines.

Table I shows considerable variability of the conductivity which ranges from 0.1 to 47.3 mmho/m, consistent with changing formation mineralogy. The high conductivity associated with the glauconite content of the soil degrades rapidly as the quartz content of the soil increases. Borings D1, D2, and D3

[4] John W. Walker, William H. Hulse, and Donald W. Eckart, "Observations of the electrical conductivity of tropical soils of Western Puerto Rico," Bull. Geol. Soc. Amer. (in press).

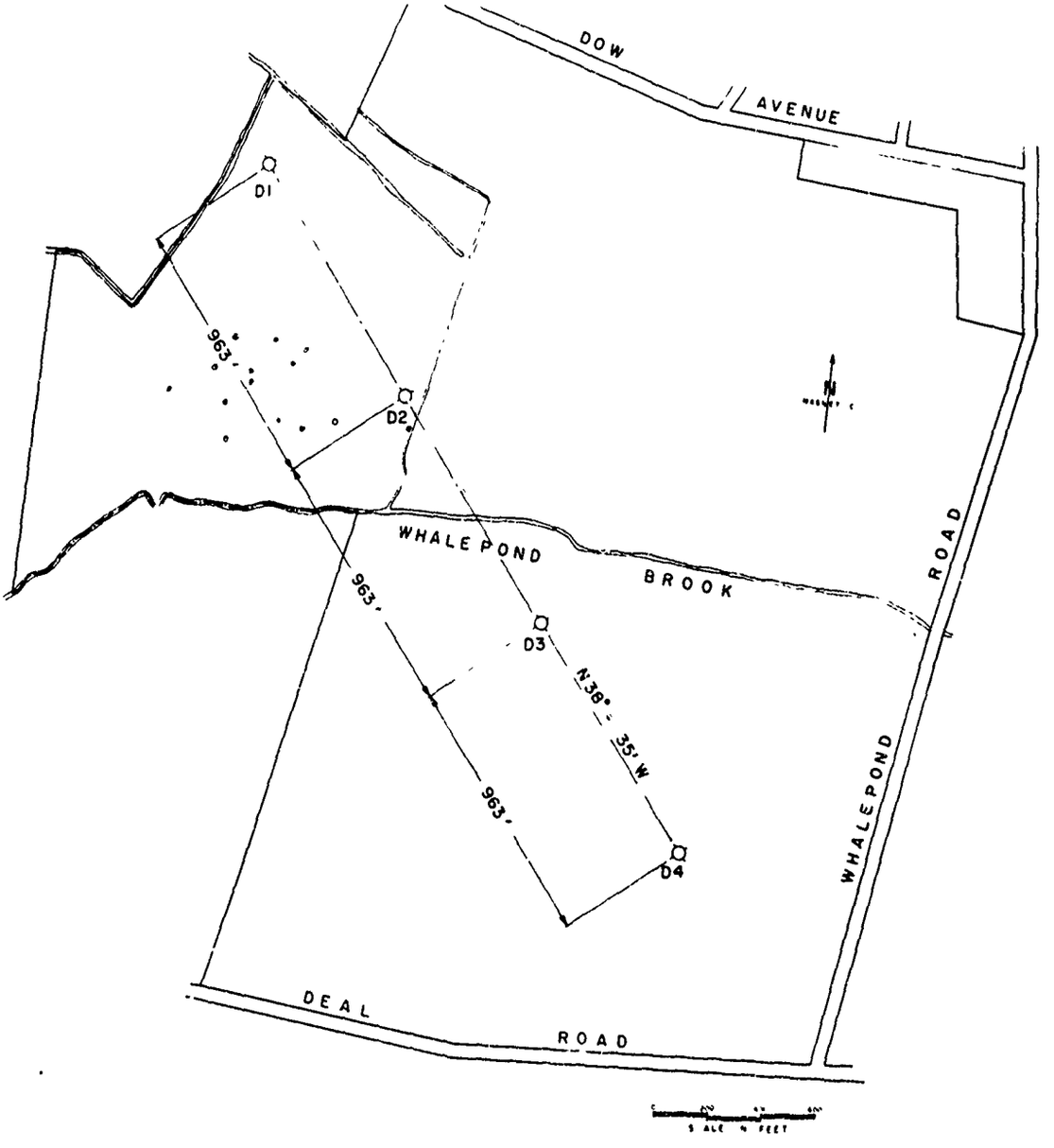

Figure 2. Deal Test Site.

are within the poor drainage and high water table area; the samples, therefore, were quite moist. With the exception of the samples from D4, which were apparently all Cape May sand and gravel, the soils reflected the variability and inhomogenities of the local geology.

Borings D1, D2, and D3 were abandoned at -5, -2, and -4 feet, respectively, because of shallow water conditions. Boring D4 was abandoned at -7 feet because of hole collapse and continuous sloughing of the unconsolidated sand and gravel precluding sample differentiation.

The relatively high conductivity of the glauconitic material and the high moisture content associated with the water conditions in the vicinity of Borings D1, D2, and D3 undoubtedly combine to form an excellent natural counterpoise for good antenna performance as well as to establish good electrical grounding.

C. The Wayside Site

This field test site is located near the village of Wayside, N. J. and is adjacent to the Earle Naval Ammunition Depot. The site is essentially a plains area with the exception of a few small rises near Boring W1. The site is heavily forested by a variety of generally small trees such as scrub oaks, shagbark pines, and locust; however, some cleared areas are present.

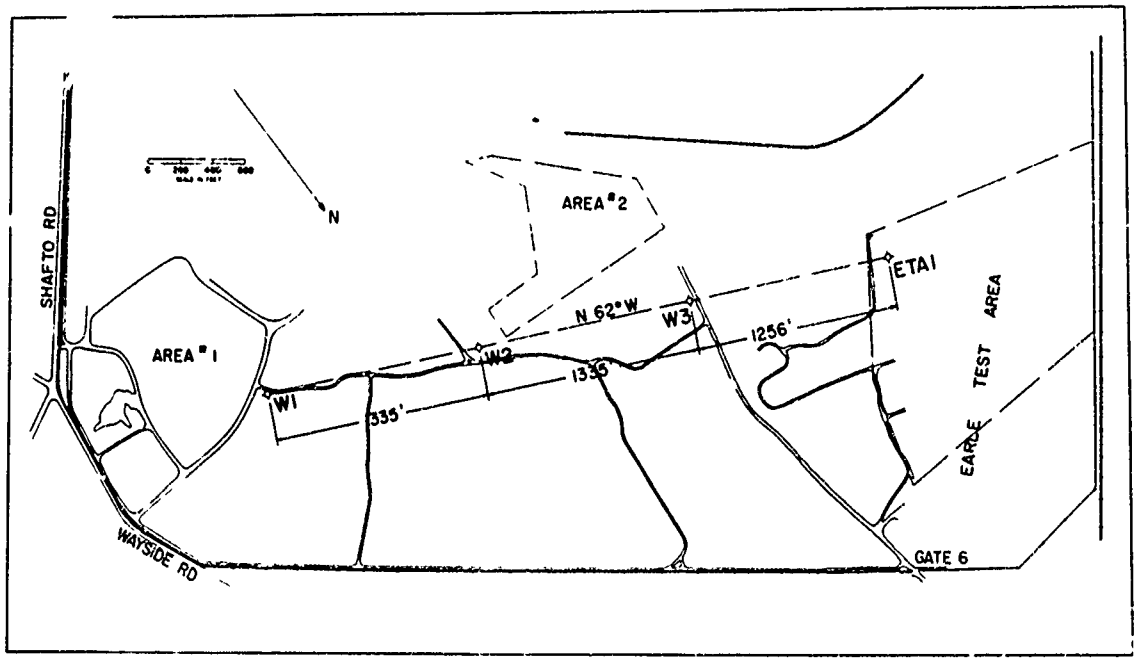

Figure 3. Wayside Test Site.

Figure 3 shows the location of the borings and the southeasterly boundaries of the property. The western portion of the test area where Boring ETA 1 was made lies within the Earle Naval Ammunition Depot. Although a small exposure of the Cohansey gravels lies within the test area, the area encompassed was not large enough to be considered representative of the site. The local soil is derived from a thin veneer of a fine-to-very-fine grained micaceous quartz sand, the Kirkwood formation of Tertiary age, but is dominated by the underlying glauconitic quartz sand of the Vincentown formation. The latter has a distinctive olive-green color and the included quartz sand may appear almost ash-like. Although the color is decidedly dominated by green of the glauconite, the bulk of a sample is predominantly quartz sand as reflected by the very low electrical conductivity. Since the subsurface material is relatively homogeneous, the electrical properties show a similar homogeneous distribution.

VI. SUMMARY

The Evans Area G Test Site is fairly uniform with respect to both soil materials and electrical properties. The conductivity of all samples tested was less than 5 mmho/m, averaging 1 mmho/m. The soil is dominated by a quartz gravel or gravelly sand with minor amounts of kaolin clay.

The Wayside Test Site contains the most uniform soil of the three areas investigated. Subsurface materials are homogeneously composed of glauconitic quartz sand and exhibit a maximum conductivity of 1.9 mmho/m; the average, 0.6 mmho/m.

The Deal Test Site subsurface material is the most conductive and shows considerable variability in both physical and electrical properties. Conductivities range from 0.1 to 47.3 mmho/m, the average being 9.2 mmho/m. This broad range in conductivity is attributable to two distinctly different soils with contrasting mineral suites and moisture regimes: one similar to that of the Evans Area G, is a relatively dry, well-drained quartz dominated material of low conductivity; the other is a poorly-drained, moist glauconite-rich material of relatively high conductivity. The high conductivity and the high water table combine to form an excellent natural counterpoise and an efficient electrical ground which result in good antenna performance in this area.

However desirable these combined characteristics of the area may be, they cannot be considered typical of the Coastal Plain. The occurrence of glauconite in sufficient concentration as to have electrical significance is very limited in the local stratigraphic column; only the Hornerstown and Vincentown formations contain a concentration of the mineral. Of the two formations, only the Hornerstown has been found to occur sufficiently free of quartz so that its electrical characteristics become significantly different than the overlying and underlying quartz-rich formations.

The Evans Area G and Wayside Test Sites are more typical of the New Jersey Coastal Plain in terms of the areal extent of the material represented by the physical and electrical characteristics. If, for the purpose of making an electrical environmental association, the New Jersey Coastal Plain is defined as a quartz-kaolin environment (the percent content of the montmorillonite group minerals being low but not necessarily absent), the

electrical significance of the data for two of the three local test areas discussed is applicable to a much larger area. As representative of a predominantly quartz-kaolin environment, the data holds certain statistical relevance to the entire Atlantic Coastal Plain southward to at least the Carolinas. At that point, increasing amounts of montmorillonite clay may enter the system as indicated by Neiheisel and Weaver[5] and the restricted definition as a quartz-kaolin environment would no longer be valid.

[5] J. Neiheisel and C. E. Weaver, "Transportation and deposition of clay minerals, southeastern United States," J. Sediment. Petrol., vol. 37, no. 4, pp. 1084-1116, 1967.

Table I. Electromagnetic Properties of Soil Samples

LEGEND: σ_{dc} = low-freq. conductivity; MC = moisture content; DD = dry density; SG = specific gravity

EG1 0-1ft.; σ_{dc} 5 mmho/m; MC 22.5%; DD 1.63; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.2572006E+01	5.7752023E+00	1.9828389E+00	9.1920728E-02
1.0000000E+02	2.2570256E+01	6.3054906E+00	2.1665893E+00	5.0184409E-02
1.5000000E+02	2.2569939E+01	7.1886295E+00	2.4703843E+00	3.8142650E-02
2.0000000E+02	2.2569841E+01	8.4249331E+00	2.8953680E+00	3.3526976E-02
2.5000000E+02	2.2569809E+01	1.0014439E+01	3.4416768E+00	3.1881970E-02
3.0000000E+02	2.2569806E+01	1.1957155E+01	4.1093383E+00	3.1722338E-02
3.5000000E+02	2.2569819E+01	1.4253082E+01	4.8983553E+00	3.2411495E-02
4.0000000E+02	2.2569843E+01	1.6902217E+01	5.8087220E+00	3.3631138E-02
4.5000000E+02	2.2569875E+01	1.9904559E+01	6.8404282E+00	3.5204429E-02
5.0000000E+02	2.2569914E+01	2.3260104E+01	7.9934611E+00	3.7025263E-02

EG1 1-2ft.; σ_{dc} 2.5 mmho/m; MC 20.1%; DD 1.74; SG 2.68

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.1444678E+01	2.9821975E+00	1.0512447E+00	4.9961248E-02
1.0000000E+02	2.1444151E+01	3.4764864E+00	1.2257521E+00	2.9121792E-02
1.5000000E+02	2.1444064E+01	4.3001911E+00	1.5162313E+00	2.4014626E-02
2.0000000E+02	2.1444046E+01	5.4533615E+00	1.9228489E+00	2.2840940E-02
2.5000000E+02	2.1444052E+01	6.9360024E+00	2.4456204E+00	2.3240678E-02
3.0000000E+02	2.1444070E+01	8.7481133E+00	3.0845439E+00	2.4427124E-02
3.5000000E+02	2.1444096E+01	1.0889692E+01	3.8396125E+00	2.6063108E-02
4.0000000E+02	2.1444130E+01	1.3360736E+01	4.7108168E+00	2.7980042E-02
4.5000000E+02	2.1444169E+01	1.6161241E+01	5.6981454E+00	3.0084263E-02
5.0000000E+02	2.1444214E+01	1.9291203E+01	6.8015849E+00	3.2319572E-02

EGl 2-3ft.; σ_{dc} 2.3 mmho/m; MC 17.7%; DD 1.80; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.9386105E+01	2.7696740E+00	1.0268406E+00	5.1328020E-02
1.0000000E+02	1.9385464E+01	3.2010456E+00	1.1870488E+00	2.9662111E-02
1.5000000E+02	1.9385357E+01	3.9198587E+00	1.4536647E+00	2.4215406E-02
2.0000000E+02	1.9385333E+01	4.9261772E+00	1.8268701E+00	2.2824074E-02
2.5000000E+02	1.9385337E+01	6.2200072E+00	2.3066830E+00	2.3054937E-02
3.0000000E+02	1.9385355E+01	7.8013486E+00	2.8931026E+00	2.4096895E-02
3.5000000E+02	1.9385382E+01	9.6701993E+00	3.5861233E+00	2.5602326E-02
4.0000000E+02	1.9385417E+01	1.1826556E+01	4.3857366E+00	2.7397414E-02
4.5000000E+02	1.9385458E+01	1.4270416E+01	5.2919325E+00	2.9385593E-02
5.0000000E+02	1.9385506E+01	1.7001775E+01	6.3046993E+00	3.1508921E-02

EGl 3-½ft.; σ_{dc} 0.4 mmho/m; MC 06.4%; DD 1.76; SG 2.6.

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	7.4930773E+00	6.0749460E-01	3.6235047E-01	2.9127192E-02
1.0000000E+02	7.4923987E+00	7.1015398E-01	4.2363214E-01	1.7026213E-02
1.5000000E+02	7.4922874E+00	8.8114484E-01	5.2564422E-01	1.4084065E-02
2.0000000E+02	7.4922656E+00	1.1205162E+00	6.6844294E-01	1.3432641E-02
2.5000000E+02	7.4922743E+00	1.4282726E+00	8.5203339E-01	1.3697580E-02
3.0000000E+02	7.4922991E+00	1.8044133E+00	1.0764150E+00	1.4420691E-02
3.5000000E+02	7.4923348E+00	2.2489361E+00	1.3415850E+00	1.5405589E-02
4.0000000E+02	7.4923794E+00	2.7618381E+00	1.6475401E+00	1.6554073E-02
4.5000000E+02	7.4924320E+00	3.3431156E+00	1.9942762E+00	1.7811581E-02
5.0000000E+02	7.4924919E+00	3.9927646E+00	2.3817886E+00	1.9145373E-02

EGl 4-5ft.; σ_{dc} 0.1 mmho/m; MC 0.28%; DD 1.67; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	4.5371084E+00	2.2413886E-01	1.7181974E-01	1.7748204E-02
1.000000E+02	4.5365948E+00	2.6131910E-01	2.0033781E-01	1.0347313E-02
1.500000E+02	4.5365102E+00	3.2321602E-01	2.4779387E-01	8.5323005E-03
2.000000E+02	4.5364930E+00	3.0986151E-01	3.1422158E-01	8.1147156E-03
2.500000E+02	4.5364987E+00	5.2125853E-01	3.9962408E-01	8.2561730E-03
3.000000E+02	4.5365163E+00	6.5740673E-01	5.0400102E-01	8.6771443E-03
3.500000E+02	4.5365420E+00	8.1830479E-01	6.2735089E-01	9.2578154E-03
4.000000E+02	4.5365743E+00	1.0039509E+00	7.6967198E-01	9.9382717E-03
4.500000E+02	4.5366124E+00	1.2143429E+00	9.3096179E-01	1.0685222E-02
5.000000E+02	4.5366558E+00	1.4494782E+00	1.1112178E+00	1.1478689E-02

EGl 5-6ft.; σ_{dc} 0.1 mmho/m; MC 0.37%; DD 1.69; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	5.1581859E+00	1.9910633E-01	1.4314912E-01	1.3867701E-02
1.000000E+02	5.1579549E+00	2.4996309E-01	1.7971964E-01	8.7053204E-03
1.500000E+02	5.1579243E+00	3.3470250E-01	2.4064716E-01	7.7710398E-03
2.000000E+02	5.1579282E+00	4.5333357E-01	3.2594135E-01	7.8940343E-03
2.500000E+02	5.1579458E+00	6.0585626E-01	4.3560203E-01	8.4399373E-03
3.000000E+02	5.1579723E+00	7.9226920E-01	5.6962768E-01	9.1972696E-03
3.500000E+02	5.1580059E+00	1.0125705E+00	7.2801676E-01	1.0075388E-02
4.000000E+02	5.1580458E+00	1.2667577E+00	9.1076625E-01	1.1028965E-02
4.500000E+02	5.1580917E+00	1.5548281E+00	1.1178732E+00	1.2032814E-02
5.000000E+02	5.1581434E+00	1.8767786E+00	1.3493345E+00	1.3071819E-02

EGl 6-7ft.; σdc 0.1 mmho/m; MC 2.0%; DD 1.62; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0C000000E+01	3.88113880E+00	2.70204050E-01	2.2394474E-01	2.5012039E-02
1.0C000000E+02	3.8798514E+00	2.9593009E-01	2.4532055E-01	1.3701258E-02
1.5C000000E+02	3.8796204E+00	3.3851901E-01	2.8063709E-01	1.0449343E-02
2.0C000000E+02	3.8795490E+00	3.9810485E-01	3.3003863E-01	9.2166403E-03
2.5C000000E+02	3.8795265E+00	4.7470353E-01	3.9354231E-01	8.7920498E-03
3.0C000000E+02	3.8795255E+00	5.6831820E-01	4.7115156E-01	8.7715858E-03
3.5C000000E+02	3.8795365E+00	6.7894910E-01	5.6286660E-01	8.9820557E-03
4.0C000000E+02	3.8795556E+00	8.0659542E-01	6.6868664E-01	9.3368458E-03
4.5C000000E+02	3.8795810E+00	9.5125583E-01	7.8861004E-01	9.7878298E-03
5.0C000000E+02	3.8796116E+00	1.1129287E+00	9.2263517E-01	1.0306127E-02

EGl 7-8ft.; σdc 0.1 mmho/m; MC 2.9%; DD 1.63; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0C000000E+01	4.4405778E+00	2.2288909E-01	1.7270860E-01	1.8032906E-02
1.0C000000E+02	4.4400840E+00	2.6046894E-01	2.0180447E-01	1.0537829E-02
1.5C000000E+02	4.4400030E+00	3.2303626E-01	2.5033301E-01	8.7129086E-03
2.0C000000E+02	4.4399870E+00	4.1062089E-01	3.1820646E-01	8.3064556E-03
2.5C000000E+02	4.4399932E+00	5.2322556E-01	4.0546788E-01	8.4674579E-03
3.0C000000E+02	4.4400111E+00	6.6084988E-01	5.1211683E-01	8.9121793E-03
3.5C000000E+02	4.4400369E+00	8.2349252E-01	6.3815182E-01	9.5190027E-03
4.0C000000E+02	4.4400691E+00	1.0111517E+00	7.8357092E-01	1.0227112E-02
4.5C000000E+02	4.4401071E+00	1.2238253E+00	9.4837188E-01	1.1002715E-02
5.0C000000E+02	4.4401504E+00	1.4615107E+00	1.1325519E+00	1.1825533E-02

EGl 8-9ft.; σdc 0.2 mmho/m; MC 4.3%; DD 1.75; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0C0000L0E+01	5.8C65109E+00	3.5508759E-01	2.4061030E-01	2.1970334E-02
1.CC0000L0E+02	5.8C59513E+00	4.1786537E-01	2.8317386E-01	1.2928538E-02
1.500000L0E+02	5.8C58607E+00	5.2241609E-01	3.5402952E-01	1.0775690E-02
2.0C0000L0E+02	5.8C58446E+00	6.6877536E-01	4.5321503E-01	1.0345971E-02
2.500000C0E+02	5.8C58543E+00	8.5694627E-01	5.8073368E-01	1.0605566E-02
3.0C0000C0E+02	5.8C58776E+00	1.0869281E+00	7.3658451E-01	1.1209805E-02
3.500000L0E+02	5.8C59107E+00	1.3587188E+00	9.2076579E-01	1.2010957E-02
4.0C0000L0E+02	5.8C59516E+00	1.6723161E+00	1.1332746E+00	1.2935147E-02
4.500000L0E+02	5.8C59995E+00	2.0277167E+00	1.3741077E+00	1.3941329E-02
5.0CC000C0E+02	5.8C60542E+00	2.4249174E+00	1.6432617E+00	1.5004871E-02

EGl 9-10ft.; σdc 0.2 mmho/m; MC 4.1%; DD 1.77; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	5.7044221E+00	3.5953608E-01	2.4579406E-01	2.2643692E-02
1.000000C0E+02	5.7038010E+00	4.1972963E-01	2.8697267E-01	1.3218769E-02
1.500000C0E+02	5.7036989E+00	5.1996027E-01	3.5550682E-01	1.0917136E-02
2.000000C0E+02	5.7036785E+00	6.6026975E-01	4.5144054E-01	1.0397353E-02
2.500000C0E+02	5.7036660E+00	8.4066193E-01	5.7477786E-01	1.0590395E-02
3.000000L0E+02	5.7037079E+00	1.0611363E+00	7.2551827E-01	1.1139842E-02
3.500000C0E+02	5.7037398E+00	1.3216910E+00	9.0365979E-01	1.1892923E-02
4.000000L0E+02	5.7037797E+00	1.6223237E+00	1.1091999E+00	1.2773243E-02
4.500000C0E+02	5.7038268E+00	1.9630313E+00	1.3421355E+00	1.3738357E-02
5.0000000E+02	5.7038805E+00	2.3438105E+00	1.6024630E+00	1.4762792E-02

EG2 0-1ft.; σ_{dc} 0.4 mmho/m; MC 4.8%; DD 1.56; SG 2.55

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	5.5640960E+00	6.9101843E-01	4.7824130E-01	4.4618177E-02
1.0000000E+02	5.5617996E+00	7.5388729E-01	5.2195026E-01	2.4348796E-02
1.5000000E+02	5.5613866E+00	8.5803867E-01	5.9409972E-01	1.8476467E-02
2.0000000E+02	5.5612575E+00	1.0037661E+00	6.9501523E-01	1.6211229E-02
2.5000000E+02	5.5612148E+00	1.1911047E+00	8.2473573E-01	1.5389576E-02
3.0000000E+02	5.5612098E+00	1.4200616E+00	9.8326917E-01	1.5289844E-02
3.5000000E+02	5.5612257E+00	1.6906377E+00	1.1706164E+00	1.5602651E-02
4.0000000E+02	5.5612555E+00	2.0028316E+00	1.3867762E+00	1.6173276E-02
4.5000000E+02	5.5612956E+00	2.3566408E+00	1.6317455E+00	1.6915751E-02
5.0000000E+02	5.5613450E+00	2.7520623E+00	1.9055210E+00	1.7778488E-02

EG2 1-2ft.; σ_{dc} 0.3 mmho/m; MC 11.5%; DD 1.81; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.2453929E+01	4.4574218E-01	2.0624532E-01	1.2858601E-02
1.0000000E+02	1.2453887E+01	6.8001147E-01	3.1464522E-01	9.8083903E-03
1.5000000E+02	1.2453893E+01	1.0704568E+00	4.9530579E-01	1.0293407E-02
2.0000000E+02	1.2453911E+01	1.6170779E+00	7.4822676E-01	1.1662230E-02
2.5000000E+02	1.2453936E+01	2.3198732E+00	1.0734053E+00	1.3384556E-02
3.0000000E+02	1.2453972E+01	3.1788403E+00	1.4708373E+00	1.5283612E-02
3.5000000E+02	1.2454012E+01	4.1939761E+00	1.9405179E+00	1.7283633E-02
4.0000000E+02	1.2454059E+01	5.3652772E+00	2.4824411E+00	1.9346735E-02
4.5000000E+02	1.2454112E+01	6.6927395E+00	3.0966000E+00	2.1451865E-02
5.0000000E+02	1.2454171E+01	8.1763584E+00	3.7829871E+00	2.3586391E-02

EG2 2-3ft.; σ_{dc} 1.0 mmho/m; MC 11.8%; DD 1.75; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.2279101E+01	1.3046225E+00	6.0783411E-01	3.8171101E-02
1.0000000E+02	1.2278513E+01	1.5363660E+00	7.1590754E-01	2.2476844E-02
1.5000000E+02	1.2278417E+01	1.9225032E+00	8.9585837E-01	1.8750802E-02
2.0000000E+02	1.2278401E+01	2.4630802E+00	1.1477639E+00	1.8017443E-02
2.5000000E+02	1.2278411E+01	3.1581008E+00	1.4716309E+00	1.8481202E-02
3.0000000E+02	1.2278436E+01	4.0075640E+00	1.8674576E+00	1.9543510E-02
3.5000000E+02	1.2278471E+01	5.0114673E+00	2.3352399E+00	2.0947826E-02
4.0000000E+02	1.2278515E+01	6.1698075E+00	2.8749719E+00	2.2565875E-02
4.5000000E+02	1.2278566E+01	7.4825805E+00	3.4866472E+00	2.4326389E-02
5.0000000E+02	1.2278624E+01	8.9497817E+00	4.1702580E+00	2.6186601E-02

EG2 3-4ft.; σ_{dc} 0.1 mmho/m; MC 4.0%; DD 1.73; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	5.5413724E+00	1.9249116E-01	1.3352304E-01	1.2479864E-02
1.0000000E+02	5.5412005E+00	2.4945243E-01	1.7303933E-01	8.0866804E-03
1.5000000E+02	5.5411815E+00	3.4437323E-01	2.3888435E-01	7.4425568E-03
2.0000000E+02	5.5411900E+00	4.7725913E-01	3.3106405E-01	7.7358425E-03
2.5000000E+02	5.5412105E+00	6.4810955E-01	4.4957775E-01	8.4040800E-03
3.0000000E+02	5.5412392E+00	8.5692292E-01	5.9442381E-01	9.2597660E-03
3.5000000E+02	5.5412749E+00	1.1036971E+00	7.6560002E-01	1.0222534E-02
4.0000000E+02	5.5413170E+00	1.3884296E+00	9.6310373E-01	1.1252196E-02
4.5000000E+02	5.5413651E+00	1.7111175E+00	1.1869318E+00	1.2326420E-02
5.0000000E+02	5.5414193E+00	2.0717573E+00	1.4370807E+00	1.3431802E-02

EG2 4-5ft.; σdc 0.2 mmho/m; MC 2.8%; DD 1.65; SG 2.57

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.000000E+01	4.5156145E+00	4.3815533E-01	3.3664044E-01	3.4860021E-02
1.000000E+02	4.5134834E+00	4.7521327E-01	3.6523784E-01	1.8913118E-02
1.500000E+02	4.5130974E+00	5.3639547E-01	4.1228667E-01	1.4233298E-02
2.000000E+02	4.5129746E+00	6.2197286E-01	4.7807301E-01	1.2378413E-02
2.500000E+02	4.5129313E+00	7.3197809E-01	5.6263131E-01	1.1654288E-02
3.000000E+02	4.5129221E+00	8.6641815E-01	6.6596897E-01	1.1495685E-02
3.500000E+02	4.5129316E+00	1.0252943E+00	7.8808734E-01	1.1660258E-02
4.000000E+02	4.5129532E+00	1.2086057E+00	9.2898550E-01	1.2026804E-02
4.500000E+02	4.5129839E+00	1.4163508E+00	1.0886618E+00	1.2527977E-02
5.000000E+02	4.5130219E+00	1.6485273E+00	1.2671138E+00	1.3123362E-02

EG2 5-6ft.; σdc 0.1 mmho/m; MC 2.8%; DD 1.71; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.000000E+01	4.5844958E+00	2.2171916E-01	1.6908442E-01	1.7375130E-02
1.000000E+02	4.5840134E+00	2.5983009E-01	1.9816339E-01	1.0181927E-02
1.500000E+02	4.5839347E+00	3.2328445E-01	2.4656095E-01	8.4458147E-03
2.000000E+02	4.5839198E+00	4.1211115E-01	3.1430764E-01	8.0748372E-03
2.500000E+02	4.5839267E+00	5.2631279E-01	4.0140616E-01	8.2499754E-03
3.000000E+02	4.5839452E+00	6.6588888E-01	5.0785591E-01	8.6981621E-03
3.500000E+02	4.5839717E+00	8.3083806E-01	6.3365564E-01	9.3023531E-03
4.000000E+02	4.5840047E+00	1.0211585E+00	7.7880318E-01	1.0004019E-02
4.500000E+02	4.5840434E+00	1.2368479E+00	9.4329642E-01	1.0770639E-02
5.000000E+02	4.5840876E+00	1.4779037E+00	1.1271325E+00	1.1582695E-02

EG2 6-7ft.; σdc 0.1 mmho/m; MC 3.0%; DD 1.60; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	4.4610176E+00	2.2132923E-01	1.7110674E-01	1.7824659E-02
1.0000000E+02	4.4605438E+00	2.5951526E-01	2.0064374E-01	1.0451088E-02
1.5000000E+02	4.4604666E+00	3.2309686E-01	2.4980499E-01	8.6745628E-03
2.0000000E+02	4.4604520E+00	4.1210199E-01	3.1862083E-01	8.2981685E-03
2.5000000E+02	4.4604591E+00	5.2653315E-01	4.0709391E-01	8.4818885E-03
3.0000000E+02	4.4604774E+00	6.6638986E-01	5.1522381E-01	8.9456559E-03
3.5000000E+02	4.4605037E+00	8.3167077E-01	6.4300903E-01	9.5694263E-03
4.0000000E+02	4.4605364E+00	1.0223741E+00	7.9044762E-01	1.0293170E-02
4.5000000E+02	4.4605748E+00	1.2384976E+00	9.5753719E-01	1.1083533E-02
5.0000000E+02	4.4606185E+00	1.4800387E+00	1.1442749E+00	1.1920498E-02

EG2 7-8ft.; σdc 0.1 mmho/m; MC 3.1%; DD 1.60; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	4.5254222E+00	2.1813514E-01	1.6743350E-01	1.7317410E-02
1.0000000E+02	4.5249878E+00	2.5766733E-01	1.9779147E-01	1.0228887E-02
1.5000000E+02	4.5249180E+00	3.2350003E-01	2.4832909E-01	8.5616755E-03
2.0000000E+02	4.5249064E+00	4.1565767E-01	3.1907288E-01	8.2505445E-03
2.5000000E+02	4.5249150E+00	5.3414227E-01	4.1002505E-01	8.4818957E-03
3.0000000E+02	4.5249345E+00	6.7895323E-01	5.2118502E-01	8.9844751E-03
3.5000000E+02	4.5249618E+00	8.5008910E-01	6.5255106E-01	9.6420170E-03
4.0000000E+02	4.5249954E+00	1.0475480E+00	8.0412122E-01	1.0396381E-02
4.5000000E+02	4.5250348E+00	1.2713277E+00	9.7589311E-01	1.1215263E-02
5.0000000E+02	4.5250796E+00	1.5214255E+00	1.1678639E+00	1.2079275E-02

EG3 0-1ft.; σdc 4.4 mmho/m; MC 19.5%; DD 1.62; SG 2.57

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.9600663E+01	5.1704428E+00	1.9345899E+00	9.7763197E-02
1.0000000E+02	1.8998244E+01	5.5970477E+00	2.0961046E+00	5.2921479E-02
1.5000000E+02	1.8997803E+01	6.3070469E+00	2.3623877E+00	3.9757367E-02
2.0000000E+02	1.8997662E+01	7.3009104E+00	2.7347954E+00	3.4517018E-02
2.5000000E+02	1.8997612E+01	8.5786952E+00	3.2134914E+00	3.2446557E-02
3.0000000E+02	1.8997601E+01	1.0140413E+01	3.7985111E+00	3.1961125E-02
3.5000000E+02	1.8997611E+01	1.1986068E+01	4.4898608E+00	3.2381436E-02
4.0000000E+02	1.8997634E+01	1.4115656E+01	5.2875374E+00	3.3367831E-02
4.5000000E+02	1.8997668E+01	1.6529177E+01	6.1915329E+00	3.4731604E-02
5.0000000E+02	1.8997710E+01	1.9226626E+01	7.2018368E+00	3.6359529E-02

EG3 1-2ft.; σdc 5.2 mmho/m; MC 24.2%; DD 1.39; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.9967582E+01	6.0430488E+00	2.2050424E+00	1.0872941E-01
1.0000000E+02	1.9964995E+01	6.5104236E+00	2.3782152E+00	5.8576908E-02
1.5000000E+02	1.9964522E+01	7.2882056E+00	2.6628704E+00	4.3717654E-02
2.0000000E+02	1.9964369E+01	8.3769425E+00	3.0608584E+00	3.7686549E-02
2.5000000E+02	1.9964312E+01	9.7767014E+00	3.5724038E+00	3.5187175E-02
3.0000000E+02	1.9964296E+01	1.1487497E+01	4.1975565E+00	3.4453756E-02
3.5000000E+02	1.9964302E+01	1.3509333E+01	4.9363271E+00	3.4729468E-02
4.0000000E+02	1.9964322E+01	1.5842208E+01	5.7887136E+00	3.5635886E-02
4.5000000E+02	1.9964352E+01	1.8486120E+01	6.7547078E+00	3.6962764E-02
5.0000000E+02	1.9964390E+01	2.1441065E+01	7.8342983E+00	3.8583952E-02

EG3 2-3ft.; σdc 0.7 mmho/m; MC 9.3%; DD 1.66; SG 2.59

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	9.3794137E+00	9.6850646E-01	5.1630051E-01	3.7097380E-02
1.0000000E+02	9.3786395E+00	1.1238225E+00	5.9919088E-01	2.1525055E-02
1.5000000E+02	9.3785107E+00	1.3825432E+00	7.3715261E-01	1.7653872E-02
2.0000000E+02	9.3784832E+00	1.7447321E+00	9.3027181E-01	1.6709081E-02
2.5000000E+02	9.3784896E+00	2.2103954E+00	1.1785568E+00	1.6934932E-02
3.0000000E+02	9.3785135E+00	2.7795326E+00	1.4820069E+00	1.7746099E-02
3.5000000E+02	9.3785492E+00	3.4521413E+00	1.8406191E+00	1.8891710E-02
4.0000000E+02	9.3785942E+00	4.2282185E+00	2.2543890E+00	2.0246320E-02
4.5000000E+02	9.3786474E+00	5.1077601E+00	2.7233113E+00	2.1740232E-02
5.0000000E+02	9.3787083E+00	6.0907617E+00	3.2473799E+00	2.3331625E-02

EG3 3-4ft.; σdc 0.3 mmho/m; MC 6.9%; DD 1.54; SG 2.58

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	6.8714024E+00	4.7066848E-01	2.9317174E-01	2.4608556E-02
1.0000000E+02	6.8709442E+00	5.6608762E-01	3.5263557E-01	1.4799725E-02
1.5000000E+02	6.8708738E+00	7.2505959E-01	4.5167037E-01	1.2637375E-02
2.0000000E+02	6.8708664E+00	9.4761088E-01	5.9030782E-01	1.2387251E-02
2.5000000E+02	6.8708818E+00	1.2337432E+00	7.6854987E-01	1.2902049E-02
3.0000000E+02	6.8709102E+00	1.5834552E+00	9.8639503E-01	1.3799288E-02
3.5000000E+02	6.8709482E+00	1.9967446E+00	1.2438403E+00	1.4915032E-02
4.0000000E+02	6.8709944E+00	2.4736082E+00	1.5408823E+00	1.6167309E-02
4.5000000E+02	6.8710480E+00	3.0140425E+00	1.8775166E+00	1.7510570E-02
5.0000000E+02	6.8711088E+00	3.6180434E+00	2.2537382E+00	1.8917483E-02

EG3 4-5ft.; σdc 0.3 mmho/m; MC 6.4%; DD 1.66; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0000000E+01	7.0084720E+00	4.7068143E-01	2.9029954E-01	2.4127934E-02
1.0000000E+02	7.0080139E+00	5.6607655E-01	3.4916348E-01	1.4509974E-02
1.5000000E+02	7.0079435E+00	7.2500832E-01	4.4720011E-01	1.2389322E-02
2.0000000E+02	7.0079361E+00	9.4750331E-01	5.8444042E-01	1.2143588E-02
2.5000000E+02	7.0079515E+00	1.2335632E+00	7.6088624E-01	1.2647851E-02
3.0000000E+02	7.0079799E+00	1.5831868E+00	9.7653619E-01	1.3527092E-02
3.5000000E+02	7.0080178E+00	1.9963715E+00	1.2313875E+00	1.4620577E-02
4.0000000E+02	7.0080640E+00	2.4731144E+00	1.5254364E+00	1.5847931E-02
4.5000000E+02	7.0081176E+00	3.0134119E+00	1.8586789E+00	1.7164494E-02
5.0000000E+02	7.0081783E+00	3.6172598E+00	2.2311102E+00	1.8543468E-02

EG3 5-6ft.; σdc 0.3 mmho/m; MC 8.4%; DD 1.59; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0000000E+01	8.2175599E+00	4.5121161E-01	2.5701014E-01	1.9726671E-02
1.0000000E+02	8.2173391E+00	5.7922626E-01	3.2994116E-01	1.2662033E-02
1.5000000E+02	8.2173131E+00	7.9256182E-01	4.5146443E-01	1.1550438E-02
2.0000000E+02	8.2173217E+00	1.0912270E+00	6.2159106E-01	1.1927275E-02
2.5000000E+02	8.2173450E+00	1.4752211E+00	8.4032034E-01	1.2899474E-02
3.0000000E+02	8.2173782E+00	1.9445422E+00	1.1076496E+00	1.4169328E-02
3.5000000E+02	8.2174195E+00	2.4991874E+00	1.4235752E+00	1.5609239E-02
4.0000000E+02	8.2174684E+00	3.1391533E+00	1.7880929E+00	1.7155402E-02
4.5000000E+02	8.2175245E+00	3.8644362E+00	2.2011978E+00	1.8772367E-02
5.0000000E+02	8.2175875E+00	4.6750315E+00	2.6628840E+00	2.0438857E-02

EG3 6-7ft.; σdc 1.3 mmho/m; MC 18.3%; DD 1.75; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.9452887E+01	1.6280021E+00	6.0266561E-01	3.0066806E-02
1.0000000E+02	1.9452691E+01	2.0625524E+00	7.6358608E-01	1.9046348E-02
1.5000000E+02	1.9452666E+01	2.7867777E+00	1.0317140E+00	1.7156091E-02
2.0000000E+02	1.9452671E+01	3.8006881E+00	1.4070788E+00	1.7548475E-02
2.5000000E+02	1.9452689E+01	5.1042833E+00	1.8896798E+00	1.8853915E-02
3.0000000E+02	1.9452714E+01	6.6975616E+00	2.4795113E+00	2.0615870E-02
3.5000000E+02	1.9452745E+01	8.5805202E+00	3.1765662E+00	2.2638679E-02
4.0000000E+02	1.9452783E+01	1.0753156E+01	3.9808350E+00	2.4824506E-02
4.5000000E+02	1.9452826E+01	1.3215465E+01	4.8923075E+00	2.7118999E-02
5.0000000E+02	1.9452875E+01	1.5967444E+01	5.9109716E+00	2.9489542E-02

EG4 0-1ft.; σdc 3.7 mmho/m; MC 16.0%; DD 1.64; SG 2.55

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.5547231E+01	4.4581338E+00	1.8438062E+00	1.0301879E-01
1.0000000E+02	1.5543806E+01	4.7848057E+00	1.9809904E+00	5.5295953E-02
1.5000000E+02	1.5543178E+01	5.3277106E+00	2.2061846E+00	4.1048375E-02
2.0000000E+02	1.5542972E+01	6.0875702E+00	2.5209971E+00	3.5177610E-02
2.5000000E+02	1.5542894E+01	7.0644728E+00	2.9256239E+00	3.2658353E-02
3.0000000E+02	1.5542869E+01	8.2584385E+00	3.4201092E+00	3.1814999E-02
3.5000000E+02	1.5542872E+01	9.6694719E+00	4.0044635E+00	3.1929333E-02
4.0000000E+02	1.5542893E+01	1.1297573E+01	4.6786866E+00	3.2642221E-02
4.5000000E+02	1.5542927E+01	1.3142739E+01	5.4427728E+00	3.3754134E-02
5.0000000E+02	1.5542971E+01	1.5204967E+01	6.2967141E+00	3.5145347E-02

EG4 1-2ft.; σdc 0.7 mmho/m; MC 10.8%; DD 1.71; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.1033861E+01	9.4530684E-01	4.6464385E-01	3.0779511E-02
1.0000000E+02	1.1033439E+01	1.1436294E+00	5.6217766E-01	1.8619191E-02
1.5000000E+02	1.1033376E+01	1.4741067E+00	7.2464177E-01	1.5999841E-02
2.0000000E+02	1.1033371E+01	1.9367651E+00	9.5207668E-01	1.5766132E-02
2.5000000E+02	1.1033387E+01	2.5316063E+00	1.2444847E+00	1.6486699E-02
3.0000000E+02	1.1033416E+01	3.2586285E+00	1.6018633E+00	1.7684388E-02
3.5000000E+02	1.1033454E+01	4.1178292E+00	2.0242084E+00	1.9154694E-02
4.0000000E+02	1.1033500E+01	5.1092048E+00	2.5115142E+00	2.0795360E-02
4.5000000E+02	1.1033553E+01	6.2327513E+00	3.0637763E+00	2.2549573E-02
5.0000000E+02	1.1033613E+01	7.4884642E+00	3.6809860E+00	2.4383240E-02

EG4 2-3ft.; σdc 0.6 mmho/m; MC 12.3%; DD 1.65; SG 2.59

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.1969868E+01	8.1438910E-01	3.8434160E-01	2.4443253E-02
1.0000000E+02	1.1969648E+01	1.0405200E+00	4.9108772E-01	1.5615484E-02
1.5000000E+02	1.1969621E+01	1.4173799E+00	6.6895626E-01	1.4180809E-02
2.0000000E+02	1.1969629E+01	1.9449788E+00	9.1796373E-01	1.4594547E-02
2.5000000E+02	1.1969650E+01	2.6233160E+00	1.2381092E+00	1.5747643E-02
3.0000000E+02	1.1969682E+01	3.4523895E+00	1.6293893E+00	1.7270398E-02
3.5000000E+02	1.1969721E+01	4.4321963E+00	2.0917989E+00	1.9004364E-02
4.0000000E+02	1.1969767E+01	5.5627330E+00	2.6253323E+00	2.0870312E-02
4.5000000E+02	1.1969820E+01	6.8439955E+00	3.2299825E+00	2.2824222E-02
5.0000000E+02	1.1969880E+01	8.2759790E+00	3.9057419E+00	2.4839679E-02

EG4 3-4ft.; σdc 0.5 mmho/m; MC 9.4%; DD 1.64; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	9.2837062E+00	7.0677981E-01	3.7874368E-01	2.7351374E-02
1.0000000E+02	9.2833127E+00	8.6174469E-01	4.6182197E-01	1.6674854E-02
1.5000000E+02	9.2832546E+00	1.1199676E+00	6.0021458E-01	1.4447754E-02
2.0000000E+02	9.2832519E+00	1.4814710E+00	7.9395246E-01	1.4333407E-02
2.5000000E+02	9.2832699E+00	1.9462561E+00	1.0430370E+00	1.5064177E-02
3.0000000E+02	9.2833001E+00	2.5143210E+00	1.3474660E+00	1.6217485E-02
3.5000000E+02	9.2833396E+00	3.1856632E+00	1.7072356E+00	1.7612215E-02
4.0000000E+02	9.2833872E+00	3.9602792E+00	2.1223412E+00	1.9157805E-02
4.5000000E+02	9.2834423E+00	4.8381649E+00	2.5927773E+00	2.0803937E-02
5.0000000E+02	9.2835045E+00	5.8193159E+00	3.1185376E+00	2.2520415E-02

EG4 4-5ft.; σdc 0.2 mmho/m; MC 8.8%; DD 1.58; SG 2.59

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	8.4785367E+00	3.1430471E-01	1.7625578E-01	1.3318226E-02
1.0000000E+02	8.4784565E+00	4.4928194E-01	2.5195223E-01	9.5189397E-03
1.5000000E+02	8.4784565E+00	6.7423783E-01	3.7810494E-01	9.5233878E-03
2.0000000E+02	8.4784742E+00	9.8917354E-01	5.5471541E-01	1.0478792E-02
2.5000000E+02	8.4785018E+00	1.3940875E+00	7.8178158E-01	1.1814554E-02
3.0000000E+02	8.4785373E+00	1.8889774E+00	1.0593006E+00	1.3340466E-02
3.5000000E+02	8.4785801E+00	2.4738404E+00	1.3872684E+00	1.4975003E-02
4.0000000E+02	8.4786299E+00	3.1486730E+00	1.7656808E+00	1.6677399E-02
4.5000000E+02	8.4786866E+00	3.9134713E+00	2.1945323E+00	1.8424999E-02
5.0000000E+02	8.4787501E+00	4.7682308E+00	2.6738174E+00	2.0204208E-02

EG4 5-6ft.; σdc 0.5 mmho/m; MC 12.6%; DD 1.86; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.4049884E+01	6.9170997E-01	3.0132367E-01	1.7687551E-02
1.0000000E+02	1.4049798E+01	9.6874677E-01	4.2201653E-01	1.2385873E-02
1.5000000E+02	1.4049795E+01	1.4304671E+00	6.2315687E-01	1.2192789E-02
2.0000000E+02	1.4049810E+01	2.0768729E+00	9.0474812E-01	1.3276876E-02
2.5000000E+02	1.4049834E+01	2.9079626E+00	1.2667875E+00	1.4871816E-02
3.0000000E+02	1.4049866E+01	3.9237339E+00	1.7092707E+00	1.6722166E-02
3.5000000E+02	1.4049904E+01	5.1241839E+00	2.2321920E+00	1.8718443E-02
4.0000000E+02	1.4049949E+01	6.5093093E+00	2.8355453E+00	2.0805904E-02
4.5000000E+02	1.4049999E+01	8.0791059E+00	3.5193228E+00	2.2954133E-02
5.0000000E+02	1.4050056E+01	9.8335693E+00	4.2835159E+00	2.5144877E-02

EG4 6-7ft.; σdc 1.0 mmho/m; MC 12.6%; DD 1.83; SG 2.40

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.4060308E+01	1.2919385E+00	5.6253278E-01	3.3011359E-02
1.0000000E+02	1.4059922E+01	1.5625801E+00	6.8044301E-01	1.9963918E-02
1.5000000E+02	1.4059864E+01	2.0135918E+00	8.7685436E-01	1.7150843E-02
2.0000000E+02	1.4059859E+01	2.6449988E+00	1.1518132E+00	1.6896663E-02
2.5000000E+02	1.4059874E+01	3.4568028E+00	1.5053224E+00	1.7660055E-02
3.0000000E+02	1.4059900E+01	4.4490020E+00	1.9373788E+00	1.8947221E-02
3.5000000E+02	1.4059935E+01	5.6215941E+00	2.4479781E+00	2.0520812E-02
4.0000000E+02	1.4059977E+01	6.9745756E+00	3.0371141E+00	2.2271149E-02
4.5000000E+02	1.4060025E+01	8.5079428E+00	3.7047797E+00	2.4155295E-02
5.0000000E+02	1.4060081E+01	1.0221691E+01	4.4509671E+00	2.6118688E-02

EG4 7-8ft.; σdc 1.6 mmho/m; MC 19.2%; DD 1.66; SG 2.45

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.9387035E+01	1.9705102E+00	7.3065641E-01	3.6516043E-02
1.0000000E+02	1.9386729E+01	2.4020569E+00	8.9077227E-01	2.2256925E-02
1.5000000E+02	1.9386684E+01	3.1212539E+00	1.1574965E+00	1.9280608E-02
2.0000000E+02	1.9386682E+01	4.1281217E+00	1.5308881E+00	1.9125176E-02
2.5000000E+02	1.9386696E+01	5.4226614E+00	2.0109498E+00	2.0098105E-02
3.0000000E+02	1.9386719E+01	7.0048715E+00	2.5976771E+00	2.1635205E-02
3.5000000E+02	1.9386750E+01	8.8747494E+00	3.2910630E+00	2.3494676E-02
4.0000000E+02	1.9386787E+01	1.1032292E+01	4.0910986E+00	2.5555615E-02
4.5000000E+02	1.9386829E+01	1.3477496E+01	4.9977735E+00	2.7750851E-02
5.0000000E+02	1.9386878E+01	1.6210356E+01	6.0110759E+00	3.0040081E-02

D1 0-1ft.; σdc 2.1 mmho/m; MC 20.7%; DD 1.50; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.8364972E+01	2.5440485E+00	9.6907737E-01	4.9768151E-02
1.0000000E+02	1.8364389E+01	2.9593882E+00	1.1275369E+00	2.8947554E-02
1.5000000E+02	1.8364292E+01	3.6514994E+00	1.3912844E+00	2.3811799E-02
2.0000000E+02	1.8364272E+01	4.6204375E+00	1.7604799E+00	2.2597781E-02
2.5000000E+02	1.8364278E+01	5.8662077E+00	2.2351386E+00	2.2952499E-02
3.0000000E+02	1.8364297E+01	7.3888094E+00	2.8152591E+00	2.4091582E-02
3.5000000E+02	1.8364325E+01	9.1882406E+00	3.5008350E+00	2.5678861E-02
4.0000000E+02	1.8364360E+01	1.1264498E+01	4.2918577E+00	2.7546248E-02
4.5000000E+02	1.8364402E+01	1.3617579E+01	5.1883169E+00	2.9600360E-02
5.0000000E+02	1.8364450E+01	1.6247478E+01	6.1902004E+00	3.1785162E-02

Dl 1-2ft.; σdc 1.5 mmho/m; MC 22.0%; DD 1.69; SG 2.70

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.2946488E+01	1.8569496E+00	6.3293439E-01	2.9073701E-02
1.0000000E+02	2.2946343E+01	2.3975506E+00	8.1724914E-01	1.8768982E-02
1.5000000E+02	2.2946327E+01	3.2985344E+00	1.1243743E+00	1.7214840E-02
2.0000000E+02	2.2946333E+01	4.5599078E+00	1.5543352E+00	1.7848395E-02
2.5000000E+02	2.2946350E+01	6.1816702E+00	2.1071296E+00	1.9357026E-02
3.0000000E+02	2.2946373E+01	8.1638198E+00	2.7827507E+00	2.1303184E-02
3.5000000E+02	2.2946402E+01	1.0506354E+01	3.5811897E+00	2.3499348E-02
4.0000000E+02	2.2946436E+01	1.3209270E+01	4.5024354E+00	2.5851754E-02
4.5000000E+02	2.2946475E+01	1.6272565E+01	5.5464754E+00	2.8308310E-02
5.0000000E+02	2.2946518E+01	1.9696234E+01	6.7132952E+00	3.0837758E-02

Dl 2-3ft.; σdc 4.6 mmho/m; MC 28.9%; DD 1.52; SG 2.72

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.7820803E+01	5.2648073E+00	1.6289573E+00	6.7987525E-02
1.0000000E+02	2.7820096E+01	5.9561077E+00	1.8435950E+00	3.8458322E-02
1.5000000E+02	2.7819973E+01	7.1086784E+00	2.2003188E+00	3.0597832E-02
2.0000000E+02	2.7819941E+01	8.7208103E+00	2.6995928E+00	2.8155098E-02
2.5000000E+02	2.7819937E+01	1.0799313E+01	3.3414680E+00	2.7879518E-02
3.0000000E+02	2.7819948E+01	1.3328588E+01	4.1259492E+00	2.8687519E-02
3.5000000E+02	2.7819967E+01	1.6323633E+01	5.0530299E+00	3.0114704E-02
4.0000000E+02	2.7819992E+01	1.9779447E+01	6.1226986E+00	3.1928872E-02
4.5000000E+02	2.7820023E+01	2.3696027E+01	7.3349408E+00	3.4001020E-02
5.0000000E+02	2.7820059E+01	2.8073369E+01	8.6897392E+00	3.6253746E-02

Dl 3-4ft.; σdc 12.8 mmho/m; MC 33.3%; DD 1.30; SG 2.71

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.6937072E+01	1.4250351E+01	4.4635249E+00	1.9006037E-01
1.0000000E+02	2.6931675E+01	1.4929327E+01	4.6917494E+00	9.9577975E-02
1.5000000E+02	2.6930651E+01	1.6056736E+01	5.0491718E+00	7.1401207E-02
2.0000000E+02	2.6930301E+01	1.7634534E+01	5.5464920E+00	5.8813793E-02
2.5000000E+02	2.6930150E+01	1.9662971E+01	6.1850473E+00	5.2463440E-02
3.0000000E+02	2.6930079E+01	2.2142107E+01	6.9651619E+00	4.9231885E-02
3.5000000E+02	2.6930049E+01	2.5071962E+01	7.8869354E+00	4.7782573E-02
4.0000000E+02	2.6930042E+01	2.8452542E+01	8.9504113E+00	4.7447185E-02
4.5000000E+02	2.6930051E+01	3.2283848E+01	1.0155587E+01	4.7854417E-02
5.0000000E+02	2.6930070E+01	3.6565880E+01	1.1502461E+01	4.8781479E-02

Dl 4-5ft.; σdc 13.6 mmho/m; MC 22.5%; DD 1.35; SG 2.75

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.7564845E+01	1.5723118E+01	6.0502114E+00	3.2159610E-01
1.0000000E+02	1.7541941E+01	1.6146109E+01	6.2736829E+00	1.6533952E-01
1.5000000E+02	1.7537297E+01	1.6820224E+01	6.5478742E+00	1.1485880E-01
2.0000000E+02	1.7535651E+01	1.7759499E+01	6.9180629E+00	9.0963094E-02
2.5000000E+02	1.7534898E+01	1.8965876E+01	7.3902083E+00	7.7717006E-02
3.0000000E+02	1.7534503E+01	2.0439846E+01	7.9658010E+00	6.9799021E-02
3.5000000E+02	1.7534280E+01	2.2181580E+01	8.6453497E+00	6.4926635E-02
4.0000000E+02	1.7534152E+01	2.4191144E+01	9.4290616E+00	6.1958094E-02
4.5000000E+02	1.7534082E+01	2.6468571E+01	1.0317029E+01	6.0258922E-02
5.0000000E+02	1.7534049E+01	2.9013874E+01	1.1309296E+01	5.9448364E-02

D2 0-1ft.; σdc 7.2 mmho/m; MC 33.6%; DD 1.23; SG 2.49

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.5468789E+01	6.1461627E+00	2.6314685E+00	1.1491069E-01
1.0000000E+02	2.5466648E+01	8.7782165E+00	2.8390635E+00	6.1918568E-02
1.5000000E+02	2.5466256E+01	9.8306291E+00	3.1801337E+00	4.6228665E-02
2.0000000E+02	2.5466129E+01	1.1303871E+01	3.6569754E+00	3.9867653E-02
2.5000000E+02	2.5466082E+01	1.3198000E+01	4.2698671E+00	3.7238517E-02
3.0000000E+02	2.5466069E+01	1.5513028E+01	5.0188705E+00	3.6475380E-02
3.5000000E+02	2.5466075E+01	1.8248959E+01	5.9039987E+00	3.6778538E-02
4.0000000E+02	2.5466091E+01	2.1405792E+01	6.9252489E+00	3.7748128E-02
4.5000000E+02	2.5466117E+01	2.4983524E+01	8.0826109E+00	3.9162001E-02
5.0000000E+02	2.5466149E+01	2.8982153E+01	9.3760705E+00	4.0886862E-02

D2 1-2ft.; σdc 47.3 mmho/m; MC 64.2%; DD 0.97; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	4.2887392E+01	5.0094263E+01	1.2234941E+01	4.1963795E-01
1.0000000E+02	4.2875274E+01	5.1268674E+01	1.2713020E+01	2.1479867E-01
1.5000000E+02	4.2872698E+01	5.3205678E+01	1.3232469E+01	1.4861831E-01
2.0000000E+02	4.2871773E+01	5.5914382E+01	1.3920641E+01	1.1714088E-01
2.5000000E+02	4.2871347E+01	5.9396120E+01	1.4794526E+01	9.9549101E-02
3.0000000E+02	4.2871121E+01	6.3651233E+01	1.5858392E+01	8.8901099E-02
3.5000000E+02	4.2870992E+01	6.8679840E+01	1.7113703E+01	8.2221256E-02
4.0000000E+02	4.2870916E+01	7.4481992E+01	1.8561058E+01	7.8021614E-02
4.5000000E+02	4.2870872E+01	8.1057708E+01	2.0200733E+01	7.5475483E-02
5.0000000E+02	4.2870849E+01	8.8407002E+01	2.2032857E+01	7.4086426E-02

D3 0-1ft.; σdc 7.1 mmho/m; MC 49.3%; DD 1.07; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	3.4423132E+01	7.9043538E+00	2.1980381E+00	8.2495905E-02
1.0000000E+02	3.4422426E+01	8.8107790E+00	2.4515539E+00	4.5978970E-02
1.5000000E+02	3.4422301E+01	1.0321254E+01	2.8721367E+00	3.5907711E-02
2.0000000E+02	3.4422265E+01	1.2435887E+01	3.4606882E+00	3.2448434E-02
2.5000000E+02	3.4422257E+01	1.5154691E+01	4.2173114E+00	3.1634003E-02
3.0000000E+02	3.4422262E+01	1.8477668E+01	5.1420220E+00	3.2142000E-02
3.5000000E+02	3.4422275E+01	2.2404816E+01	6.2348154E+00	3.3405470E-02
4.0000000E+02	3.4422293E+01	2.6936135E+01	7.4956779E+00	3.5141630E-02
4.5000000E+02	3.4422315E+01	3.2071622E+01	8.9245920E+00	3.7192445E-02
5.0000000E+02	3.4422342E+01	3.7811274E+01	1.0521536E+01	3.9463655E-02

D3 1-2ft.; σdc 4.3 mmho/m; MC 24.8%; DD 1.50; SG 2.72

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.2627357E+01	4.9849404E+00	1.7098827E+00	7.9148476E-02
1.0000000E+02	2.2626151E+01	5.5260671E+00	1.8965703E+00	4.3872449E-02
1.5000000E+02	2.2625937E+01	6.4275498E+00	2.2061849E+00	3.4019978E-02
2.0000000E+02	2.2625874E+01	7.6895721E+00	2.6394381E+00	3.0524828E-02
2.5000000E+02	2.2625858E+01	9.3121551E+00	3.1964121E+00	2.9572739E-02
3.0000000E+02	2.2625863E+01	1.1295302E+01	3.8771209E+00	2.9892199E-02
3.5000000E+02	2.2625881E+01	1.3639014E+01	4.6815625E+00	3.0938256E-02
4.0000000E+02	2.2625908E+01	1.6343287E+01	5.6097285E+00	3.2438428E-02
4.5000000E+02	2.2625941E+01	1.9408118E+01	6.6616073E+00	3.4241334E-02
5.0000000E+02	2.2625981E+01	2.2833505E+01	7.8371849E+00	3.6256140E-02

D3 2-3ft.; σdc 3.0 mmho/m; MC 19.8%; DD 1.71; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.0635775E+01	3.5525194E+00	1.2765273E+00	6.1855879E-02
1.0000000E+02	2.0634911E+01	4.0243712E+00	1.4464142E+00	3.5033365E-02
1.5000000E+02	2.0634761E+01	4.8098993E+00	1.7288469E+00	2.7914618E-02
2.0000000E+02	2.0634722E+01	5.9096074E+00	2.1241538E+00	2.5722692E-02
2.5000000E+02	2.0634718E+01	7.3235068E+00	2.6323709E+00	2.5501572E-02
3.0000000E+02	2.0634731E+01	9.0515985E+00	3.2535013E+00	2.6265860E-02
3.5000000E+02	2.0634755E+01	1.1093881E+01	3.9875403E+00	2.7593231E-02
4.0000000E+02	2.0634787E+01	1.3450352E+01	4.8344792E+00	2.9272517E-02
4.5000000E+02	2.0634826E+01	1.6121007E+01	5.7943076E+00	3.1186401E-02
5.0000000E+02	2.0634870E+01	1.9105844E+01	6.8670127E+00	3.3264491E-02

D3 3-4ft.; σdc 46.0 mmho/m; MC 26.1%; DD 1.62; SG 2.89

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.6603364E+01	5.0651205E+01	1.5249281E+01	6.8402129E-01
1.0000000E+02	2.6553726E+01	5.1400811E+01	1.6054066E+01	3.4772099E-01
1.5000000E+02	2.6540747E+01	5.2514805E+01	1.6531107E+01	2.3695385E-01
2.0000000E+02	2.6535800E+01	5.4048603E+01	1.7062256E+01	1.8293997E-01
2.5000000E+02	2.6533452E+01	5.6012822E+01	1.7705767E+01	1.5168412E-01
3.0000000E+02	2.6532163E+01	5.8410426E+01	1.8476911E+01	1.3182047E-01
3.5000000E+02	2.6531392E+01	6.1242484E+01	1.9381053E+01	1.1847075E-01
4.0000000E+02	2.6530902E+01	6.4509456E+01	2.0420460E+01	1.0919375E-01
4.5000000E+02	2.6530578E+01	6.8211561E+01	2.1596213E+01	1.0263256E-01
5.0000000E+02	2.6530360E+01	7.2348915E+01	2.2908876E+01	9.7972748E-02

D4 0-1ft.; σdc 3.7 mmho/m; MC 15.8%; DD 1.80; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.7102472E+01	4.4170720E+00	1.7422148E+00	9.2788039E-02
1.0000000E+02	1.7099930E+01	4.7834159E+00	1.8883084E+00	5.0250060E-02
1.5000000E+02	1.7099467E+01	5.3931492E+00	2.1292972E+00	3.7770698E-02
2.0000000E+02	1.7099319E+01	6.2465402E+00	2.4663474E+00	3.2810923E-02
2.5000000E+02	1.7099267E+01	7.3437167E+00	2.8995996E+00	3.0859211E-02
3.0000000E+02	1.7099256E+01	8.6846912E+00	3.4290842E+00	3.0411815E-02
3.5000000E+02	1.7099266E+01	1.0269466E+01	4.0548064E+00	3.0823983E-02
4.0000000E+02	1.7099291E+01	1.2098040E+01	4.7767634E+00	3.1773373E-02
4.5000000E+02	1.7099327E+01	1.4170410E+01	5.5949483E+00	3.3080899E-02
5.0000000E+02	1.7099371E+01	1.6486573E+01	6.5093518E+00	3.4639103E-02

D4 1-2ft.; σdc 7.5 mmho/m; MC 17.3%; DD 1.79; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.8771957E+01	8.7311641E+00	3.2792892E+00	1.6710098E-01
1.0000000E+02	1.8764562E+01	9.1485684E+00	3.4453336E+00	8.7579229E-02
1.5000000E+02	1.8763166E+01	9.8388932E+00	3.7071655E+00	6.2796477E-02
2.0000000E+02	1.8762688E+01	1.0804623E+01	4.0717354E+00	5.1721482E-02
2.5000000E+02	1.8762482E+01	1.2046073E+01	4.5399121E+00	4.6131926E-02
3.0000000E+02	1.8762386E+01	1.3563319E+01	5.1119059E+00	4.3285563E-02
3.5000000E+02	1.8762345E+01	1.5356386E+01	5.7877838E+00	4.2006867E-02
4.0000000E+02	1.8762335E+01	1.7425283E+01	6.5675679E+00	4.1708000E-02
4.5000000E+02	1.8762346E+01	1.9770010E+01	7.4512629E+00	4.2062361E-02
5.0000000E+02	1.8762372E+01	2.2390567E+01	8.4388652E+00	4.2873975E-02

D4 2-3ft.; σdc 3.6 mmho/m; MC 14.4%; DD 1.83; SG 2.67

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.000000E+01	1.579061E+01	4.338554E+00	1.780660E+00	9.871030E-02
1.000000E+02	1.578743E+01	4.667126E+00	1.917359E+00	5.310367E-02
1.500000E+02	1.578684E+01	5.213360E+00	2.142139E+00	3.954735E-02
2.000000E+02	1.578665E+01	5.977902E+00	2.456424E+00	3.401065E-02
2.500000E+02	1.578658E+01	6.960830E+00	2.860383E+00	3.168248E-02
3.000000E+02	1.578656E+01	8.162163E+00	3.354068E+00	3.095870E-02
3.500000E+02	1.578657E+01	9.581904E+00	3.937474E+00	3.115174E-02
4.000000E+02	1.578659E+01	1.122005E+01	4.610605E+00	3.191779E-02
4.500000E+02	1.578662E+01	1.307660E+01	5.373454E+00	3.306584E-02
5.000000E+02	1.578667E+01	1.515156E+01	6.226015E+00	3.448176E-02

D4 3-4ft.; σdc 0.5 mmho/m; MC 7.0%; DD 1.70; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.000000E+01	7.683231E+00	7.412522E-01	4.366077E-01	3.466079E-02
1.000000E+02	7.682326E+00	8.514906E-01	5.016196E-01	1.991010E-02
1.500000E+02	7.682174E+00	1.035056E+00	6.097755E-01	1.613521E-02
2.000000E+02	7.682138E+00	1.292023E+00	7.611659E-01	1.510582E-02
2.500000E+02	7.682140E+00	1.622401E+00	9.557999E-01	1.517478E-02
3.000000E+02	7.682161E+00	2.026189E+00	1.193678E+00	1.579289E-02
3.500000E+02	7.682196E+00	2.503385E+00	1.474797E+00	1.672479E-02
4.000000E+02	7.682239E+00	3.053987E+00	1.799155E+00	1.785278E-02
4.500000E+02	7.682292E+00	3.677990E+00	2.166746E+00	1.911145E-02
5.000000E+02	7.682352E+00	4.375392E+00	2.577565E+00	2.046158E-02

D4 4-5ft.; σdc 0.2 mmho/m; MC 4.1%; DD 1.66; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	5.3290869E+00	3.6863569E-01	2.6073541E-01	2.4851980E-02
1.000000E+02	5.3283399E+00	4.2466197E-01	3.0039924E-01	1.4316533E-02
1.500000E+02	5.3282141E+00	5.1791982E-01	3.6637592E-01	1.1640618E-02
2.000000E+02	5.3281851E+00	6.4846386E-01	4.5872477E-01	1.0931075E-02
2.500000E+02	5.3281881E+00	8.1629959E-01	5.7745190E-01	1.1008203E-02
3.000000E+02	5.3282073E+00	1.0214269E+00	7.2255708E-01	1.1478664E-02
3.500000E+02	5.3282371E+00	1.2638444E+00	8.9403873E-01	1.2173864E-02
4.000000E+02	5.3282752E+00	1.5435496E+00	1.0918944E+00	1.3009493E-02
4.500000E+02	5.3283205E+00	1.8605399E+00	1.3161210E+00	1.3938709E-02
5.000000E+02	5.3283725E+00	2.2148119E+00	1.5667150E+00	1.4933399E-02

D4 5-6ft.; σdc 0.1 mmho/m; MC 4.3%; DD 1.61; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	5.3256759E+00	1.9268657E-01	1.3633818E-01	1.2998496E-02
1.000000E+02	5.3255043E+00	2.4974110E-01	1.7671295E-01	8.4239481E-03
1.500000E+02	5.3254854E+00	3.4481756E-01	2.4398633E-01	7.7539916E-03
2.000000E+02	5.3254938E+00	4.7792142E-01	3.3817040E-01	8.0603338E-03
2.500000E+02	5.3255144E+00	6.4905213E-01	4.5925650E-01	8.7571829E-03
3.000000E+02	5.3255431E+00	8.5820811E-01	6.0725094E-01	9.6492568E-03
3.500000E+02	5.3255788E+00	1.1053873E+00	7.8214535E-01	1.0652855E-02
4.000000E+02	5.3256208E+00	1.3905871E+00	9.8393902E-01	1.1726121E-02
4.500000E+02	5.3256690E+00	1.7138048E+00	1.2126288E+00	1.2845798E-02
5.000000E+02	5.3257231E+00	2.0750369E+00	1.4682110E+00	1.3997924E-02

D4 6-7ft.; σdc 0.2 mmho/m; MC 6.6%; DD 1.72; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	7.4590258E+00	3.2065003E-01	1.9170783E-01	1.5444206E-02
1.000000E+02	7.4588665E+00	4.2431773E-01	2.5369486E-01	1.0218914E-02
1.500000E+02	7.4588516E+00	5.9708334E-01	3.5699040E-01	9.5864572E-03
2.000000E+02	7.4588637E+00	8.3895175E-01	5.0160018E-01	1.0102311E-02
2.500000E+02	7.4588882E+00	1.1499220E+00	6.8752299E-01	1.1077472E-02
3.000000E+02	7.4589217E+00	1.5299919E+00	9.1475648E-01	1.2282259E-02
3.500000E+02	7.4589628E+00	1.9791590E+00	1.1832975E+00	1.3618228E-02
4.000000E+02	7.4590110E+00	2.4974200E+00	1.4931424E+00	1.5036154E-02
4.500000E+02	7.4590662E+00	3.0847712E+00	1.8442869E+00	1.6508681E-02
5.000000E+02	7.4591282E+00	3.7412083E+00	2.2367260E+00	1.8019396E-02

W1 0-1ft.; σdc 0.2 mmho/m; MC 8.3%; DD 1.23; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	6.1015945E+00	3.2469254E-01	2.1463144E-01	1.9118128E-02
1.000000E+02	6.1013813E+00	4.1479689E-01	2.7420532E-01	1.2212195E-02
1.500000E+02	6.1013555E+00	5.6495066E-01	3.7346785E-01	1.1088667E-02
2.000000E+02	6.1013627E+00	7.7516185E-01	5.1242990E-01	1.1410954E-02
2.500000E+02	6.1013837E+00	1.0454300E+00	6.9109082E-01	1.2311558E-02
3.000000E+02	6.1014140E+00	1.3757535E+00	9.0944831E-01	1.3501290E-02
3.500000E+02	6.1014519E+00	1.7661298E+00	1.1674992E+00	1.4856202E-02
4.000000E+02	6.1014967E+00	2.2165562E+00	1.4652397E+00	1.6314313E-02
4.500000E+02	6.1015480E+00	2.7270294E+00	1.8026652E+00	1.7841185E-02
5.000000E+02	6.1016059E+00	3.2975457E+00	2.1797708E+00	1.9416148E-02

Wl 1-2ft.; σdc 0.2 mmho/m; MC 10.0%; DD 1.60; SG 2.58

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	9.5778363E+00	3.1396438E-01	1.6565393E-01	1.1776856E-02
1.0000000E+02	9.5777891E+00	4.7688089E-01	2.5161441E-01	8.9439851E-03
1.5000000E+02	9.5777952E+00	7.4840477E-01	3.9487677E-01	9.3576361E-03
2.0000000E+02	9.5778148E+00	1.1285359E+00	5.9544092E-01	1.0582916E-02
2.5000000E+02	9.5778431E+00	1.6172726E+00	8.5330430E-01	1.2132825E-02
3.0000000E+02	9.5778789E+00	2.2146125E+00	1.1684637E+00	1.3845019E-02
3.5000000E+02	9.5779217E+00	2.9205525E+00	1.5409148E+00	1.5649919E-02
4.0000000E+02	9.5779714E+00	3.7350891E+00	1.9706528E+00	1.7512730E-02
4.5000000E+02	9.5780278E+00	4.6582183E+00	2.4576719E+00	1.9414117E-02
5.0000000E+02	9.5780910E+00	5.6899355E+00	3.0019655E+00	2.1342476E-02

Wl 2-3ft.; σdc 0.2 mmho/m; MC 6.7%; DD 1.62; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	7.0377076E+00	3.2317775E-01	1.9891779E-01	1.6497823E-02
1.0000000E+02	7.0375221E+00	4.2116042E-01	2.5923521E-01	1.0750142E-02
1.5000000E+02	7.0375024E+00	5.8444805E-01	3.5974425E-01	9.9454058E-03
2.0000000E+02	7.0375128E+00	8.1304692E-01	5.0045235E-01	1.0376546E-02
2.5000000E+02	7.0375366E+00	1.1069562E+00	6.8135859E-01	1.1302023E-02
3.0000000E+02	7.0375696E+00	1.4661740E+00	9.0246064E-01	1.2474638E-02
3.5000000E+02	7.0376104E+00	1.8906976E+00	1.1637554E+00	1.3788443E-02
4.0000000E+02	7.0376585E+00	2.3805239E+00	1.4652390E+00	1.5190455E-02
4.5000000E+02	7.0377136E+00	2.9356492E+00	1.8069073E+00	1.6651236E-02
5.0000000E+02	7.0377755E+00	3.5560694E+00	2.1887552E+00	1.8153118E-02

Wl 3-4ft.; σdc 0.6 mmho/m; MC 13.5%; DD 1.66; SG 2.67

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0C0000C0E+01	1.3122313E+01	8.1173292E-01	3.6588423E-01	2.2223843E-02
1.0000000E+02	1.3122160E+01	1.0717206E+00	4.8309193E-01	1.4671099E-02
1.5000000E+02	1.3122146E+01	1.5050177E+00	6.7840885E-01	1.3735103E-02
2.0000000E+02	1.3122157E+01	2.1116299E+00	9.5184536E-01	1.4453366E-02
2.5000000E+02	1.3122180E+01	2.8915559E+00	1.3033995E+00	1.5833321E-02
3.0000000E+02	1.3122211E+01	3.8447937E+00	1.7330671E+00	1.7544103E-02
3.5000000E+02	1.3122250E+01	4.9713403E+00	2.2408428E+00	1.9443908E-02
4.0000000E+02	1.3122295E+01	6.2711921E+00	2.8267198E+00	2.1461829E-02
4.5000000E+02	1.3122347E+01	7.7443451E+00	3.4906907E+00	2.3558470E-02
5.0000000E+02	1.3122405E+01	9.3907948E+00	4.2327470E+00	2.5710192E-02

Wl 4-5ft.; σdc 1.0 mmho/m; MC 15.8%; DD 1.67; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0C0000C0E+01	1.5600158E+01	1.2842640E+00	5.3089041E-01	2.9576154E-02
1.0000000E+02	1.5599918E+01	1.6125170E+00	6.6633286E-01	1.8568141E-02
1.5000000E+02	1.5599886E+01	2.1595743E+00	8.9280168E-01	1.6578372E-02
2.0000000E+02	1.5599890E+01	2.9254487E+00	1.2094248E+00	1.6843307E-02
2.5000000E+02	1.5599908E+01	3.9101401E+00	1.6165020E+00	1.8010123E-02
3.0000000E+02	1.5599936E+01	5.1136466E+00	2.1140290E+00	1.9627864E-02
3.5000000E+02	1.5599971E+01	6.5359654E+00	2.7019997E+00	2.1503260E-02
4.0000000E+02	1.5600013E+01	8.1770930E+00	3.3804066E+00	2.3539672E-02
4.5000000E+02	1.5600061E+01	1.0037026E+01	4.1492408E+00	2.5683408E-02
5.0000000E+02	1.5600115E+01	1.2115759E+01	5.0084925E+00	2.7902251E-02

Wl 5-6ft.; σdc 0.6 mmho/m; MC 16.0%; DD 1.49; SG 2.72

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.3642764E+01	8.1121746E-01	3.5861124E-01	2.1362463E-02
1.0000000E+02	1.3642644E+01	1.0949151E+00	4.8404135E-01	1.4416781E-02
1.5000000E+02	1.3642635E+01	1.5677328E+00	6.9306697E-01	1.3761600E-02
2.0000000E+02	1.3642648E+01	2.2296743E+00	9.8569591E-01	1.4679091E-02
2.5000000E+02	1.3642671E+01	3.0807382E+00	1.3619256E+00	1.6225639E-02
3.0000000E+02	1.3642702E+01	4.1209225E+00	1.8217511E+00	1.8086695E-02
3.5000000E+02	1.3642739E+01	5.3502240E+00	2.3651666E+00	2.0127450E-02
4.0000000E+02	1.3642783E+01	6.7686395E+00	2.9921647E+00	2.2280494E-02
4.5000000E+02	1.3642834E+01	8.3761647E+00	3.7027371E+00	2.4508375E-02
5.0000000E+02	1.3642890E+01	1.0172795E+01	4.4968740E+00	2.6788620E-02

Wl 6-7ft.; σdc 0.3 mmho/m; MC 13.9%; DD 1.54; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.2349650E+01	4.4678025E-01	2.0759650E-01	1.2997378E-02
1.0000000E+02	1.2349611E+01	6.9039728E-01	3.2079640E-01	1.0042277E-02
1.5000000E+02	1.2349618E+01	1.0964224E+00	5.0945704E-01	1.0632112E-02
2.0000000E+02	1.2349637E+01	1.6648554E+00	7.7357785E-01	1.2108176E-02
2.5000000E+02	1.2349664E+01	2.3956944E+00	1.1131556E+00	1.3938713E-02
3.0000000E+02	1.2349698E+01	3.2889371E+00	1.5281858E+00	1.5946464E-02
3.5000000E+02	1.2349738E+01	4.3445803E+00	2.0186630E+00	1.8055456E-02
4.0000000E+02	1.2349785E+01	5.5626207E+00	2.5845807E+00	2.0227699E-02
4.5000000E+02	1.2349838E+01	6.9430539E+00	3.2259314E+00	2.2442084E-02
5.0000000E+02	1.2349897E+01	8.4858755E+00	3.9427066E+00	2.4685943E-02

Wl 7-8ft.; σdc 0.9 mmho/m; MC 16.3%; DD 1.67; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.6109285E+01	1.1665151E+00	4.7454569E-01	2.6015399E-02
1.0000000E+02	1.6109113E+01	1.5098115E+00	6.1423431E-01	1.6835945E-02
1.5000000E+02	1.6109094E+01	2.0819525E+00	8.4700273E-01	1.5477287E-02
2.0000000E+02	1.6109102E+01	2.8829456E+00	1.1728685E+00	1.6073909E-02
2.5000000E+02	1.6109123E+01	3.9127900E+00	1.5918298E+00	1.7452637E-02
3.0000000E+02	1.6109151E+01	5.1714837E+00	2.1038818E+00	1.9222403E-02
3.5000000E+02	1.6109186E+01	6.6590239E+00	2.7090180E+00	2.1215601E-02
4.0000000E+02	1.6109228E+01	8.3754072E+00	3.4072307E+00	2.3348427E-02
4.5000000E+02	1.6109275E+01	1.0320630E+01	4.1985105E+00	2.5574320E-02
5.0000000E+02	1.6109329E+01	1.2494687E+01	5.0829474E+00	2.7865340E-02

Wl 8-9ft.; σdc 0.4 mmho/m; MC 11.0%; DD 1.60; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION Dd/M)	LOSS TANGENT
5.0000000E+01	1.0386882E+01	5.6963672E-01	2.8860037E-01	1.9702857E-02
1.0000000E+02	1.0386725E+01	7.5518918E-01	3.8262181E-01	1.3060612E-02
1.5000000E+02	1.0386711E+01	1.0644283E+00	5.3930166E-01	1.2272510E-02
2.0000000E+02	1.0386723E+01	1.4973593E+00	7.5864781E-01	1.2948036E-02
2.5000000E+02	1.0386748E+01	2.0539810E+00	1.0406585E+00	1.4208991E-02
3.0000000E+02	1.0386781E+01	2.7342913E+00	1.3853304E+00	1.5762640E-02
3.5000000E+02	1.0386822E+01	3.5382871E+00	1.7926589E+00	1.7483514E-02
4.0000000E+02	1.0386871E+01	4.4659649E+00	2.2626399E+00	1.9308876E-02
4.5000000E+02	1.0386926E+01	5.5173206E+00	2.7952641E+00	2.1203868E-02
5.0000000E+02	1.0386988E+01	6.6923496E+00	3.3905275E+00	2.3147570E-02

W1 9-10ft.; σdc 0.4 mmho/m; MC 10.6%; DD 1.60; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.0017270E+01	5.7088485E-01	2.9451921E-01	2.0474605E-02
1.0000000E+02	1.0017091E+01	7.4724789E-01	3.8551981E-01	1.3400144E-02
1.5000000E+02	1.0017073E+01	1.0411686E+00	5.3716139E-01	1.2447306E-02
2.0000000E+02	1.0017084E+01	1.4526535E+00	7.4945355E-01	1.3024982E-02
2.5000000E+02	1.0017108E+01	1.9817017E+00	1.0223949E+00	1.4214851E-02
3.0000000E+02	1.0017142E+01	2.6283108E+00	1.3559822E+00	1.5710791E-02
3.5000000E+02	1.0017183E+01	3.3924780E+00	1.7502110E+00	1.7381602E-02
4.0000000E+02	1.0017231E+01	4.2741997E+00	2.2050761E+00	1.9161678E-02
4.5000000E+02	1.0017287E+01	5.2734720E+00	2.7205717E+00	2.1014566E-02
5.0000000E+02	1.0017349E+01	6.3902900E+00	3.2966908E+00	2.2918393E-02

W2 0-11t.; σdc 0.1 mmho/m; MC 6.4%; DD 1.42; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	5.9327437E+00	1.8071212E-01	1.2114781E-01	1.0943295E-02
1.0000000E+02	5.9326714E+00	2.5917412E-01	1.7375035E-01	7.8474354E-03
1.5000000E+02	5.9326719E+00	3.8993917E-01	2.6141523E-01	7.8712134E-03
2.0000000E+02	5.9326884E+00	5.7300815E-01	3.8414354E-01	8.6749239E-03
2.5000000E+02	5.9327140E+00	8.0837975E-01	5.4193363E-01	9.7905798E-03
3.0000000E+02	5.9327469E+00	1.0960520E+00	7.3478319E-01	1.1062175E-02
3.5000000E+02	5.9327866E+00	1.4360226E+00	9.6268919E-01	1.2422841E-02
4.0000000E+02	5.9328328E+00	1.8282886E+00	1.2256483E+00	1.3839139E-02
4.5000000E+02	5.9328854E+00	2.2728468E+00	1.5236564E+00	1.5292486E-02
5.0000000E+02	5.9329442E+00	2.7696933E+00	1.8567090E+00	1.6771728E-02

W2 1-2ft.; σdc 0.1 mmho/m; MC 6.3%; DD 1.59; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	6.6394271E+00	1.7891504E-01	1.1338067E-01	9.6812771E-03
1.0000000E+02	6.6393746E+00	2.6752388E-01	1.6953477E-01	7.2380536E-03
1.5000000E+02	6.6393793E+00	4.1520165E-01	2.6312060E-01	7.4890503E-03
2.0000000E+02	6.6393980E+00	6.2194850E-01	3.9413842E-01	8.4136053E-03
2.5000000E+02	6.6394253E+00	8.8776291E-01	5.6258650E-01	9.6075557E-03
3.0000000E+02	6.6394599E+00	1.2126428E+00	7.6846229E-01	1.0936171E-02
3.5000000E+02	6.6395014E+00	1.5965856E+00	1.0117629E+00	1.2341703E-02
4.0000000E+02	6.6395497E+00	2.0395882E+00	1.2924846E+00	1.3795272E-02
4.5000000E+02	6.6396045E+00	2.5416470E+00	1.6106234E+00	1.5280829E-02
5.0000000E+02	6.6396658E+00	3.1027580E+00	1.9661745E+00	1.6788740E-02

W2 2-3ft.; σdc 0.1 mmho/m; MC 7.0%; DD 1.63; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	7.3298514E+00	1.7767768E-01	1.0716273E-01	8.7087157E-03
1.0000000E+02	7.3298194E+00	2.8206227E-01	1.7012118E-01	6.9125476E-03
1.5000000E+02	7.3298282E+00	4.5603415E-01	2.7504898E-01	7.4507282E-03
2.0000000E+02	7.3298487E+00	6.9959281E-01	4.2194554E-01	8.5724852E-03
2.5000000E+02	7.3298773E+00	1.0127366E+00	6.1080892E-01	9.9276443E-03
3.0000000E+02	7.3299130E+00	1.3954633E+00	8.4163646E-01	1.1399473E-02
3.5000000E+02	7.3299557E+00	1.8477702E+00	1.1144248E+00	1.2937935E-02
4.0000000E+02	7.3300051E+00	2.3696540E+00	1.4291701E+00	1.4518009E-02
4.5000000E+02	7.3300612E+00	2.9611109E+00	1.7858679E+00	1.6125789E-02
5.0000000E+02	7.3301240E+00	3.6221369E+00	2.1845130E+00	1.7752926E-02

W2 3-4ft.; σdc 0.3 mmho/m; MC 8.6%; DD 1.51; SG 2.70

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	8.3902657E+00	4.4913519E-01	2.5318134E-01	1.9231705E-02
1.0000000E+02	8.3900698E+00	5.8336564E-01	3.2886083E-01	1.2489978E-02
1.5000000E+02	8.3900485E+00	8.0706408E-01	4.5496834E-01	1.1519634E-02
2.0000000E+02	8.3900587E+00	1.1202377E+00	6.3151320E-01	1.1992275E-02
2.5000000E+02	8.3900827E+00	1.5228856E+00	8.5849442E-01	1.3042097E-02
3.0000000E+02	8.3901164E+00	2.0150057E+00	1.1359092E+00	1.4380482E-02
3.5000000E+02	8.3901580E+00	2.5965953E+00	1.4637539E+00	1.5883730E-02
4.0000000E+02	8.3902071E+00	3.2676508E+00	1.8420238E+00	1.7489982E-02
4.5000000E+02	8.3902633E+00	4.0281684E+00	2.2707140E+00	1.9164872E-02
5.0000000E+02	8.3903265E+00	4.8781435E+00	2.7498184E+00	2.0887772E-02

W2 4-5ft.; σdc 1.5 mmho/m; MC 18.2%; DD 1.62; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.7499474E+01	1.8602799E+00	7.2602105E-01	3.8191764E-02
1.0000000E+02	1.7499112E+01	2.2455868E+00	8.7650734E-01	2.3051557E-02
1.5000000E+02	1.7499056E+01	2.8877062E+00	1.1271638E+00	1.9762120E-02
2.0000000E+02	1.7499051E+01	3.7866639E+00	1.4780583E+00	1.9435632E-02
2.5000000E+02	1.7499065E+01	4.9424616E+00	1.9291948E+00	2.0294337E-02
3.0000000E+02	1.7499089E+01	6.3550277E+00	2.4805695E+00	2.1745628E-02
3.5000000E+02	1.7499120E+01	8.0245697E+00	3.1321758E+00	2.3535526E-02
4.0000000E+02	1.7499159E+01	9.9508744E+00	3.8840054E+00	2.5537036E-02
4.5000000E+02	1.7499203E+01	1.2134008E+01	4.7360482E+00	2.7679606E-02
5.0000000E+02	1.7499254E+01	1.4573966E+01	5.6882931E+00	2.9920899E-02

W2 5-6ft.; σdc 0.1 mmho/m; MC 16.4%; DD 1.82; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.8066420E+01	2.4601711E-01	9.4512802E-02	4.8922608E-03
1.0000000E+02	1.8066427E+01	6.3826589E-01	2.4520306E-01	6.3462297E-03
1.5000000E+02	1.8066440E+01	1.2920130E+00	4.9635134E-01	8.5642524E-03
2.0000000E+02	1.8066459E+01	2.2072572E+00	8.4795431E-01	1.0973277E-02
2.5000000E+02	1.8066483E+01	3.3839967E+00	1.3000074E+00	1.3458688E-02
3.0000000E+02	1.8066513E+01	4.8222293E+00	1.8525049E+00	1.5982278E-02
3.5000000E+02	1.8066548E+01	6.5219522E+00	2.5054396E+00	1.8527670E-02
4.0000000E+02	1.8066588E+01	8.4831620E+00	3.2588030E+00	2.1086672E-02
4.5000000E+02	1.8066634E+01	1.0705855E+01	4.1125853E+00	2.3654731E-02
5.0000000E+02	1.8066685E+01	1.3190027E+01	5.0667755E+00	2.6229114E-02

W2 6-7ft.; σdc 1.5 mmho/m; MC 17.1%; DD 1.80; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.8082111E+01	1.8578684E+00	7.0177074E-01	3.5727728E-02
1.0000000E+02	1.8081804E+01	2.2680635E+00	8.5680607E-01	2.1808349E-02
1.5000000E+02	1.8081759E+01	2.9516751E+00	1.1150717E+00	1.8921080E-02
2.0000000E+02	1.8081758E+01	3.9087235E+00	1.4766225E+00	1.8792027E-02
2.5000000E+02	1.8081772E+01	5.1392097E+00	1.9414609E+00	1.9766768E-02
3.0000000E+02	1.8081796E+01	6.6431320E+00	2.5095827E+00	2.1292145E-02
3.5000000E+02	1.8081827E+01	8.4204880E+00	3.1809811E+00	2.3133230E-02
4.0000000E+02	1.8081865E+01	1.0471274E+01	3.9556476E+00	2.5171305E-02
4.5000000E+02	1.8081909E+01	1.2795488E+01	4.8335722E+00	2.7340692E-02
5.0000000E+02	1.8081958E+01	1.5393124E+01	5.8147435E+00	2.9601981E-02

W2 7-8ft.; σdc 1.4 mmho/m; MC 18.8%; DD 1.76; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.0163076E+01	1.7418124E+00	6.3333465E-01	3.1035660E-02
1.0000000E+02	2.0162875E+01	2.1975642E+00	7.9911094E-01	1.9578324E-02
1.5000000E+02	2.0162849E+01	2.9571239E+00	1.0753241E+00	1.7563569E-02
2.0000000E+02	2.0162854E+01	4.0205024E+00	1.4620070E+00	1.7909553E-02
2.5000000E+02	2.0162870E+01	5.3876995E+00	1.9591592E+00	1.9199831E-02
3.0000000E+02	2.0162895E+01	7.0587133E+00	2.5667751E+00	2.0962246E-02
3.5000000E+02	2.0162926E+01	9.0335414E+00	3.2848467E+00	2.2994441E-02
4.0000000E+02	2.0162962E+01	1.1312181E+01	4.1133650E+00	2.5195234E-02
4.5000000E+02	2.0163005E+01	1.3894627E+01	5.0523189E+00	2.7508414E-02
5.0000000E+02	2.0163052E+01	1.6780877E+01	6.1016959E+00	2.9900248E-02

W2 8-9ft.; σdc 1.2 mmho/m; MC 17.3%; DD 1.72; SG 2.67

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.7820789E+01	1.5139023E+00	5.8552627E-01	3.0520196E-02
1.0000000E+02	1.7820568E+01	1.9043956E+00	7.3661229E-01	1.9196499E-02
1.5000000E+02	1.7820539E+01	2.5551887E+00	9.8834624E-01	1.7171067E-02
2.0000000E+02	1.7820543E+01	3.4662935E+00	1.3407594E+00	1.7470318E-02
2.5000000E+02	1.7820561E+01	4.6377099E+00	1.7938514E+00	1.8699441E-02
3.0000000E+02	1.7820587E+01	6.0694360E+00	2.3476174E+00	2.0393487E-02
3.5000000E+02	1.7820620E+01	7.7614691E+00	3.0020503E+00	2.2353189E-02
4.0000000E+02	1.7820659E+01	9.7138061E+00	3.7571418E+00	2.4478911E-02
4.5000000E+02	1.7820704E+01	1.1926443E+01	4.6128818E+00	2.6715295E-02
5.0000000E+02	1.7820755E+01	1.4399376E+01	5.5692593E+00	2.9029127E-02

W2 9-10ft.; σdc 1.0 mmho/m; MC 16.8%; DD 1.71; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0000000E+01	1.7178376E+01	1.2829770E+00	5.0541867E-01	2.6832007E-02
1.0000000E+02	1.7178202E+01	1.6540763E+00	6.5164788E-01	1.7296739E-02
1.5000000E+02	1.7178182E+01	2.2725547E+00	8.9531256E-01	1.5842813E-02
2.0000000E+02	1.7178190E+01	3.1384201E+00	1.2364322E+00	1.6409301E-02
2.5000000E+02	1.7178209E+01	4.2516718E+00	1.6750053E+00	1.7783951E-02
3.0000000E+02	1.7178237E+01	5.6123078E+00	2.2110266E+00	1.9562667E-02
3.5000000E+02	1.7178271E+01	7.2203254E+00	2.8444895E+00	2.1572262E-02
4.0000000E+02	1.7178311E+01	9.0757212E+00	3.5753858E+00	2.3726141E-02
4.5000000E+02	1.7178357E+01	1.1178491E+01	4.4037060E+00	2.5976191E-02
5.0000000E+02	1.7178409E+01	1.3528632E+01	5.3294393E+00	2.8293543E-02

W3 0-1ft.; σdc 0.3 mmho/m; MC 7.6%; DD 1.62; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M	LOSS TANGENT
5.0000000E+01	7.7464638E+00	4.5684522E-01	2.6801279E-01	2.1187611E-02
1.0000000E+02	7.7461758E+00	5.7197103E-01	3.3557019E-01	1.3263957E-02
1.5000000E+02	7.7461373E+00	7.6381576E-01	4.4812690E-01	1.1808605E-02
2.0000000E+02	7.7461414E+00	1.0323925E+00	6.0569909E-01	1.1970598E-02
2.5000000E+02	7.7461625E+00	1.3777014E+00	8.0828682E-01	1.2779530E-02
3.0000000E+02	7.7461944E+00	1.7997404E+00	1.0558877E+00	1.3911906E-02
3.5000000E+02	7.7462349E+00	2.2985069E+00	1.3484985E+00	1.5229074E-02
4.0000000E+02	7.7462831E+00	2.8739976E+00	1.6861151E+00	1.6661706E-02
4.5000000E+02	7.7463385E+00	3.5262088E+00	2.0687329E+00	1.8171277E-02
5.0000000E+02	7.7464011E+00	4.2551361E+00	2.4963466E+00	1.9734670E-02

W3 1-2ft.; σdc 0.2 mmho/m; MC 9.5%; DD 1.69; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	9.7017093E+00	3.1399334E-01	1.6460822E-01	1.1627560E-02
1.0000000E+02	9.7016628E+00	4.7766601E-01	2.5041458E-01	8.8432250E-03
1.5000000E+02	9.7016690E+00	7.5045018E-01	3.9342010E-01	9.2634032E-03
2.0000000E+02	9.7016886E+00	1.1323458E+00	5.9362477E-01	1.0483062E-02
2.5000000E+02	9.7017169E+00	1.6233511E+00	8.5102602E-01	1.2029928E-02
3.0000000E+02	9.7017525E+00	2.2234636E+00	1.1656207E+00	1.3722871E-02
3.5000000E+02	9.7017952E+00	2.9326805E+00	1.5374047E+00	1.5514258E-02
4.0000000E+02	9.7018447E+00	3.7509982E+00	1.9663729E+00	1.7362768E-02
4.5000000E+02	9.7019010E+00	4.6784126E+00	2.4525199E+00	1.9249328E-02
5.0000000E+02	9.7019640E+00	5.7149192E+00	2.9958393E+00	2.1162494E-02

W3 2-3ft.; σdc 0.3 mmho/m; MC 8.2%; DD 1.70; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	8.6413741E+00	4.4878038E-01	2.4927924E-01	1.8658102E-02
1.0000000E+02	8.6411835E+00	5.8421713E-01	3.2452055E-01	1.2144719E-02
1.5000000E+02	8.6411631E+00	8.0992669E-01	4.4989933E-01	1.1224543E-02
2.0000000E+02	8.6411735E+00	1.1259159E+00	6.2542430E-01	1.1702796E-02
2.5000000E+02	8.6411976E+00	1.5321840E+00	8.5109433E-01	1.2740410E-02
3.0000000E+02	8.6412311E+00	2.0287288E+00	1.1269068E+00	1.4057676E-02
3.5000000E+02	8.6412726E+00	2.6155475E+00	1.4528582E+00	1.5534714E-02
4.0000000E+02	8.6413216E+00	3.2926367E+00	1.8289439E+00	1.7111578E-02
4.5000000E+02	8.6413775E+00	4.0599925E+00	2.2551593E+00	1.8754960E-02
5.0000000E+02	8.6414405E+00	4.9176104E+00	2.7314982E+00	2.0444872E-02

W3 3-4ft.; σdc 0.3 mmho/m; MC 9.8%; DD 1.67; SG 2.38

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000[illegible]E+01	1.0103635E+01	4.4310693E-01	2.2762439E-01	1.5756049E-02
1.000000[illegible]E+02	1.0103527E+01	6.1101332E-01	3.1388485E-01	1.0863358E-02
1.5[illegible]000000E+02	1.0103522E+01	8.9084827E-01	4.5763991E-01	1.0559081E-02
2.000000[illegible]E+02	1.0103537E+01	1.2826143E+00	6.5889297E-01	1.1401948E-02
2.5[illegible]E+02	1.0103563E+01	1.7863099E+00	9.1764217E-01	1.2703654E-02
3.000000[illegible]E+02	1.0103597E+01	2.4019330E+00	1.2338843E+00	1.4234756E-02
3.5[illegible]E+02	1.0103638E+01	3.1294806E+00	1.6076156E+00	1.5896914E-02
4.000000[illegible]E+02	1.0103687E+01	3.9689492E+00	2.0388313E+00	1.7640955E-02
4.5[illegible]E+02	1.0103742E+01	4.9203349E+00	2.5275258E+00	1.9439556E-02
5.000000[illegible]E+02	1.0103803E+01	5.9836332E+00	3.0736931E+00	2.1276319E-02

W3 4-5ft.; σdc 0.2 mmho/m; MC 8.8%; DD 1.67; SG 2.55

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	9.0622916E+00	3.1371125E-01	1.7016304E-01	1.2436795E-02
1.0000000E+02	9.0622265E+00	4.5899132E-01	2.4896888E-01	9.0982102E-03
1.5000000E+02	9.0622292E+00	7.0111982E-01	3.8030554E-01	9.2651477E-03
2.0000000E+02	9.0622477E+00	1.0400973E+00	5.6417368E-01	1.0308476E-02
2.5[illegible]E+02	9.0622755E+00	1.4759222E+00	8.0057120E-01	1.1702337E-02
3.0000000E+02	9.0623110E+00	2.0085921E+00	1.0894951E+00	1.3271437E-02
3.5000000E+02	9.0623536E+00	2.6381042E+00	1.4309415E+00	1.4940644E-02
4.0000000E+02	9.0624032E+00	3.3644549E+00	1.8249060E+00	1.6672386E-02
4.5000000E+02	9.0624595E+00	4.1876404E+00	2.2713834E+00	1.8445787E-02
5.0000000E+02	9.0625227E+00	5.1076561E+00	2.7703676E+00	2.0248318E-02

W3 5-6ft.; σdc 0.9 mmho/m; MC 18.2%; DD 1.72; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.8923149E+01	1.1702712E+00	4.3926395E-01	2.2218232E-02
1.0000000E+02	1.8923051E+01	1.5906295E+00	5.9706778E-01	1.5099560E-02
1.5000000E+02	1.8923044E+01	2.2912168E+00	8.6004634E-01	1.4500078E-02
2.0000000E+02	1.8923056E+01	3.2720361E+00	1.2282080E+00	1.5530421E-02
2.5000000E+02	1.8923076E+01	4.5330861E+00	1.7015495E+00	1.7212686E-02
3.0000000E+02	1.8923103E+01	6.0743648E+00	2.2800648E+00	1.9220898E-02
3.5000000E+02	1.8923136E+01	7.8958694E+00	2.9637465E+00	2.1415351E-02
4.0000000E+02	1.8923175E+01	9.9975968E+00	3.7525856E+00	2.3726191E-02
4.5000000E+02	1.8923219E+01	1.2379543E+01	4.6465717E+00	2.6114607E-02
5.0000000E+02	1.8923269E+01	1.5041704E+01	5.6456931E+00	2.8557310E-02

W3 6-7ft.; σdc 1.4 mmho/m; MC 21.2%; DD 1.67; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	2.1713075E+01	1.7429076E+00	6.1070450E-01	2.8838286E-02
1.0000000E+02	2.1712922E+01	2.2460557E+00	7.8705521E-01	1.8581838E-02
1.5000000E+02	2.1712904E+01	3.0846171E+00	1.0809090E+00	1.7012906E-02
2.0000000E+02	2.1712911E+01	4.2585989E+00	1.4922907E+00	1.7615911E-02
2.5000000E+02	2.1712928E+01	5.7680007E+00	2.0211981E+00	1.9087687E-02
3.0000000E+02	2.1712952E+01	7.6128204E+00	2.6676250E+00	2.0993840E-02
3.5000000E+02	2.1712982E+01	9.7930558E+00	3.4315629E+00	2.3148195E-02
4.0000000E+02	2.1713017E+01	1.2308704E+01	4.3130014E+00	2.5457665E-02
4.5000000E+02	2.1713057E+01	1.5159760E+01	5.3119287E+00	2.7870532E-02
5.0000000E+02	2.1713103E+01	1.8346222E+01	6.4283312E+00	3.0355764E-02

W3 7-8ft.; σdc 1.9 mmho/m; MC 23.8%; DD 1.60; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	2.3567218E+01	2.3038721E+00	7.7481823E-01	3.5120967E-02
1.000000E+02	2.3567004E+01	2.8638131E+00	9.6329817E-01	2.1828642E-02
1.500000E+02	2.3566975E+01	3.7970168E+00	1.2771237E+00	1.9294514E-02
2.000000E+02	2.3566976E+01	5.1034964E+00	1.7165557E+00	1.9450034E-02
2.500000E+02	2.3566990E+01	6.7832521E+00	2.2815250E+00	2.0681414E-02
3.000000E+02	2.3567012E+01	8.8362822E+00	2.9720253E+00	2.2450717E-02
3.500000E+02	2.3567039E+01	1.1262584E+01	3.7880477E+00	2.4527393E-02
4.000000E+02	2.3567072E+01	1.4062156E+01	4.7295811E+00	2.6796168E-02
4.500000E+02	2.3567110E+01	1.7234993E+01	5.7966122E+00	2.9192997E-02
5.000000E+02	2.3567153E+01	2.0781093E+01	6.9891266E+00	3.1679452E-02

ETA1 0-1ft.; σdc 0.6 mmho/m; MC 11.3%; DD 1.50; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	9.8541807E+00	8.2667664E-01	4.2997030E-01	3.0139160E-02
1.000000E+02	9.8537756E+00	1.0028630E+00	5.2165656E-01	1.8282069E-02
1.500000E+02	9.8537135E+00	1.2964494E+00	6.7438000E-01	1.5756175E-02
2.000000E+02	9.8537091E+00	1.7074610E+00	8.8817861E-01	1.5563507E-02
2.500000E+02	9.8537262E+00	2.2358991E+00	1.1630546E+00	1.6304148E-02
3.000000E+02	9.8537550E+00	2.8817622E+00	1.4990053E+00	1.7511426E-02
3.500000E+02	9.8537945E+00	3.6450475E+00	1.8960266E+00	1.8985326E-02
4.000000E+02	9.8538414E+00	4.5257515E+00	2.3541134E+00	2.0625836E-02
4.500000E+02	9.8538957E+00	5.5238702E+00	2.8732595E+00	2.2377388E-02
5.000000E+02	9.8539572E+00	6.6393990E+00	3.4534580E+00	2.4206639E-02

ETAl 1-2ft.; σdc 0.8 mmho/m; MC 13.4%; DD 1.63; SG 2.65

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.2761953E+01	1.0549175E+00	4.8214162E-01	2.9697355E-02
1.0000000E+02	1.2761646E+01	1.3056475E+00	5.9688350E-01	1.8378313E-02
1.5000000E+02	1.2761603E+01	1.7234901E+00	7.8777926E-01	1.6173303E-02
2.0000000E+02	1.2761605E+01	2.3084627E+00	1.0551603E+00	1.6247030E-02
2.5000000E+02	1.2761623E+01	3.0605555E+00	1.3989274E+00	1.7232257E-02
3.0000000E+02	1.2761652E+01	3.9797968E+00	1.8190769E+00	1.8673217E-02
3.5000000E+02	1.2761690E+01	5.0661537E+00	2.3156040E+00	2.0374574E-02
4.0000000E+02	1.2761735E+01	6.3196326E+00	2.8885021E+00	2.2238656E-02
4.5000000E+02	1.2761786E+01	7.7402297E+00	3.5377640E+00	2.4211198E-02
5.0000000E+02	1.2761844E+01	9.3279402E+00	4.2633811E+00	2.6259637E-02

ETAl 2-3ft.; σdc 0.4 mmho/m; MC 9.8%; DD 1.78; SG 2.62

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	1.0581781E+01	5.6982108E-01	2.6602327E-01	1.9346221E-02
1.0000000E+02	1.0581621E+01	7.5309019E-01	3.7802851E-01	1.2784425E-02
1.5000000E+02	1.0581606E+01	1.0285234E+00	5.3134846E-01	1.1979647E-02
2.0000000E+02	1.0581618E+01	1.4861260E+00	7.4599090E-01	1.2614208E-02
2.5000000E+02	1.0581642E+01	2.0358971E+00	1.0219543E+00	1.3824491E-02
3.0000000E+02	1.0581675E+01	2.7078344E+00	1.3592354E+00	1.5322613E-02
3.5000000E+02	1.0581716E+01	3.5019349E+00	1.7578301E+00	1.6985187E-02
4.0000000E+02	1.0581764E+01	4.4181953E+00	2.2177334E+00	1.8750518E-02
4.5000000E+02	1.0581819E+01	5.4566115E+00	2.7389395E+00	2.0584324E-02
5.0000000E+02	1.0581880E+01	6.6171790E+00	3.3214416E+00	2.2466036E-02

ETAl 3-4ft.; σdc 0.4 mmho/m; MC 10.5%; DD 1.72; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	1.0828417E+01	5.6896075E-01	2.6232090E-01	1.8877033E-02
1.000000E+02	1.0828275E+01	7.6122207E-01	3.7773361E-01	1.2628114E-02
1.500000E+02	1.0828263E+01	1.0816444E+00	5.3673496E-01	1.1962469E-02
2.000000E+02	1.0828276E+01	1.5302320E+00	7.5933150E-01	1.2692710E-02
2.500000E+02	1.0828301E+01	2.1069839E+00	1.0455216E+00	1.3981292E-02
3.000000E+02	1.0828335E+01	2.8118977E+00	1.3953017E+00	1.5549019E-02
3.500000E+02	1.0828375E+01	3.6449704E+00	1.8086674E+00	1.7276234E-02
4.000000E+02	1.0828423E+01	4.6061987E+00	2.2856135E+00	1.9103100E-02
4.500000E+02	1.0828478E+01	5.6955783E+00	2.8261339E+00	2.0996374E-02
5.000000E+02	1.0828540E+01	6.9131047E+00	3.4302217E+00	2.2936104E-02

ETAl 4-5ft.; σdc 0.4 mmho/m; MC 9.3%; DD 1.59; SG 2.64

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.000000E+01	8.8835981E+00	5.7856679E-01	3.1695082E-01	2.3398122E-02
1.000000E+02	8.8833120E+00	7.2508238E-01	3.9723800E-01	1.4662190E-02
1.500000E+02	8.8832739E+00	9.6924243E-01	5.3100569E-01	1.3066357E-02
2.000000E+02	8.8832782E+00	1.3110604E+00	7.1827229E-01	1.3255798E-02
2.500000E+02	8.8832995E+00	1.7505364E+00	9.5903766E-01	1.4159347E-02
3.000000E+02	8.8833316E+00	2.2876683E+00	1.2532992E+00	1.5419927E-02
3.500000E+02	8.8833723E+00	2.9224533E+00	1.6010531E+00	1.6884495E-02
4.000000E+02	8.8834208E+00	3.6548881E+00	2.0029946E+00	1.8476524E-02
4.500000E+02	8.8834765E+00	4.4849687E+00	2.4570186E+00	2.0153494E-02
5.000000E+02	8.8835393E+00	5.4126904E+00	2.9652186E+00	2.1889889E-02

ETA1 5-6ft.; σdc 0.4 mmho/m; MC 7.5%; DD 1.65; SG 2.60

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	7.8463974E+00	5.9564710E-01	3.4719708E-01	2.7273140E-02
1.0000000E+02	7.8458874E+00	7.1155379E-01	4.1479628E-01	1.6291162E-02
1.5000000E+02	7.8458077E+00	9.0465964E-01	5.2737388E-01	1.3808379E-02
2.0000000E+02	7.8457973E+00	1.1749967E+00	6.8496887E-01	1.3451043E-02
2.5000000E+02	7.8458117E+00	1.5225672E+00	8.8758416E-01	1.3943924E-02
3.0000000E+02	7.8458399E+00	1.9473700E+00	1.1352181E+00	1.4861895E-02
3.5000000E+02	7.8458781E+00	2.4494026E+00	1.4278679E+00	1.6022747E-02
4.0000000E+02	7.8459248E+00	3.0286617E+00	1.7655294E+00	1.7335367E-02
4.5000000E+02	7.8459792E+00	3.6851436E+00	2.1481980E+00	1.8749132E-02
5.0000000E+02	7.8460410E+00	4.4188440E+00	2.5758687E+00	2.0233663E-02

ETA1 6-7ft.; σdc 0.3 mmho/m; MC 6.3%; DD 1.59; SG 2.61

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	6.6502479E+00	4.7760514E-01	3.0239632E-01	2.5801655E-02
1.0000000E+02	6.6496987E+00	5.6626250E-01	3.5856401E-01	1.5296858E-02
1.5000000E+02	6.6496113E+00	7.1394729E-01	4.5208658E-01	1.2857752E-02
2.0000000E+02	6.6495977E+00	9.2069427E-01	5.8300448E-01	1.2435879E-02
2.5000000E+02	6.6496101E+00	1.1865062E+00	7.5132103E-01	1.2820951E-02
3.0000000E+02	6.6496366E+00	1.5113820E+00	9.5703498E-01	1.3609479E-02
3.5000000E+02	6.6496732E+00	1.8953195E+00	1.2001436E+00	1.4628524E-02
4.0000000E+02	6.6497182E+00	2.3383158E+00	1.4806437E+00	1.5791607E-02
4.5000000E+02	6.6497709E+00	2.8403673E+00	1.7985310E+00	1.7050680E-02
5.0000000E+02	6.6498307E+00	3.4014700E+00	2.1538010E+00	1.8376909E-02

ETA1 7-8ft.; σdc 0.2 mmho/m; MC 6.9%; DD 1.60; SG 2.66

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	7.0802426E+00	3.2222756E-01	1.9773641E-01	1.6350497E-02
1.0000000E+02	7.0800670E+00	4.2233441E-01	2.5917560E-01	1.0715329E-02
1.5000000E+02	7.0800492E+00	5.8916351E-01	3.6155541E-01	9.9653995E-03
2.0000000E+02	7.0800603E+00	8.2272057E-01	5.0488273E-01	1.0436907E-02
2.5000000E+02	7.0800844E+00	1.1230047E+00	6.8915649E-01	1.1396974E-02
3.0000000E+02	7.0801177E+00	1.4900140E+00	9.1437436E-01	1.2601290E-02
3.5000000E+02	7.0801587E+00	1.9237457E+00	1.1805330E+00	1.3945145E-02
4.0000000E+02	7.0802070E+00	2.4241966E+00	1.4876288E+00	1.5376174E-02
4.5000000E+02	7.0802623E+00	2.9913631E+00	1.8356572E+00	1.6865285E-02
5.0000000E+02	7.0803244E+00	3.6252411E+00	2.2246131E+00	1.8395015E-02

ETA1 8-9ft.; σdc 0.1 mmho/m; MC 5.8%; DD 1.59; SG 2.63

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	6.2766652E+00	1.8069106E-01	1.1776845E-01	1.0342466E-02
1.0000000E+02	6.2765953E+00	2.6072824E-01	1.6993605E-01	7.4619159E-03
1.5000000E+02	6.2765965E+00	3.9411869E-01	2.5687654E-01	7.5196560E-03
2.0000000E+02	6.2766136E+00	5.8086319E-01	3.7859075E-01	8.3119874E-03
2.5000000E+02	6.2766398E+00	8.2096038E-01	5.3507709E-01	9.3981288E-03
3.0000000E+02	6.2766735E+00	1.1144082E+00	7.2633333E-01	1.0631142E-02
3.5000000E+02	6.2767140E+00	1.4612043E+00	9.5235656E-01	1.1948048E-02
4.0000000E+02	6.2767611E+00	1.8613456E+00	1.2131435E+00	1.3317351E-02
4.5000000E+02	6.2768148E+00	2.3148287E+00	1.5086900E+00	1.4721547E-02
5.0000000E+02	6.2768748E+00	2.8216497E+00	1.8389917E+00	1.6150131E-02

ETA1 9-10ft.; σ_{dc} 0.1 mmho/m; MC 6.2%; DD 1.58; SG 2.56

FREQUENCY (MHZ)	RELATIVE DIELECTRIC CONSTANT	EFFECTIVE CONDUCTIVITY (MMHOS/M)	ATTENUATION DB/M)	LOSS TANGENT
5.0000000E+01	6.5853672E+00	1.7931910E-01	1.1410219E-01	9.7827953E-03
1.0000000E+02	6.5853105E+00	2.6551323E-01	1.6894985E-01	7.2426305E-03
1.5000000E+02	6.5853143E+00	4.0916619E-01	2.6035806E-01	7.4407787E-03
2.0000000E+02	6.5853326E+00	6.1027827E-01	3.8832725E-01	8.3235120E-03
2.5000000E+02	6.5853596E+00	8.6848801E-01	5.5285564E-01	9.4800520E-03
3.0000000E+02	6.5853940E+00	1.1848733E+00	7.5394095E-01	1.0773463E-02
3.5000000E+02	6.5854353E+00	1.5583517E+00	9.9158007E-01	1.2145051E-02
4.0000000E+02	6.5854832E+00	1.9892800E+00	1.2657695E+00	1.3565465E-02
4.5000000E+02	6.5855377E+00	2.4776547E+00	1.5765054E+00	1.5018392E-02
5.0000000E+02	6.5855988E+00	3.0234719E+00	1.9237830E+00	1.6494041E-02